U.S. Government

RESEARCH & DEVELOPMENT REPORTS

(Formerly U.S. Government Research Reports)

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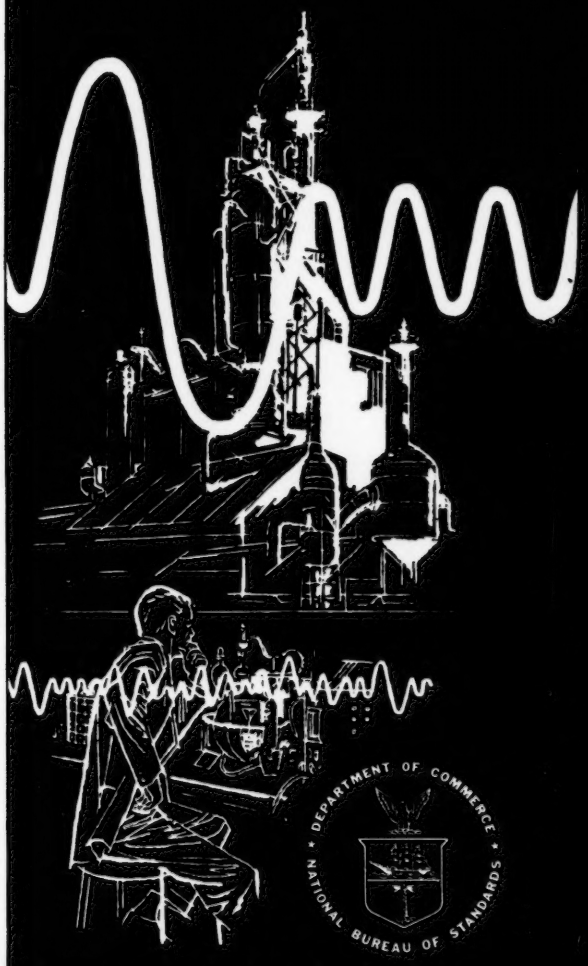

U.S. DEPARTMENT OF COMMERCE
CLEARINGHOUSE
For Federal Scientific and Technical Information
(Formerly Office of Technical Services)

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

Issued twice a month by the Clearinghouse for Federal Scientific and Technical Information (formerly Office of Technical Services). Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Address changes should be sent to Superintendent of Documents.

PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS (formerly U.S. Government Research Reports) is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability to the public of new reports of U.S. Government-sponsored research and development released by the Department of Defense and other Federal agencies. The Atomic Energy Commission and the National Aeronautics and Space Administration issue their own announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by report/accession number under 33 subject division headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective subject and number indexes.

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting report/accession numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject divisions; the subject indexes will aid in locating those reports. If a report/accession number is known, its abstract can be located by use of the number indexes. Cumulative indexes are published periodically.

TO ORDER REPORTS

Order reports by report/accession number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Superintendent of Documents deposit account. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. Reports available are listed in the following journals open to public subscription from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $25 a year domestic, $31 foreign, $1.50 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Bernard M. Fry, *Director*

Contents may be reprinted freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

SPECIAL Announcements

COMMERCE ESTABLISHES "CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION"

A Clearinghouse for Federal Scientific and Technical Information to serve as the central source for Government research data in the physical sciences and engineering has been established in the U. S. Department of Commerce, and has taken over the document distribution program of the Office of Technical Services.

Development of the Clearinghouse was endorsed last February by the Federal Council for Science and Technology, an advisory body to the President. The Council specifically calls for the Clearinghouse to serve as the single agency through which unclassified technical reports and translations generated by all Government agencies are uniformly indexed and made available to the public: provide information on Federal research in progress; and operate a referral service to sources of specialized technical expertise in the Government.

The Clearinghouse has completed its programming and expansion of staff and facilities and is now carrying out these missions. The agency is using computer and other modern data processing and reproduction equipment and techniques in order to speed and increase the flow of technical information to scientists and engineers throughout the country. To further increase efficiency, all Clearinghouse personnel and facilities were established in a new building in Springfield, Va., near Washington, in October.

The Clearinghouse is a part of the new Institute for Applied Technology in the National Bureau of Standards. The Institute is headed by Dr. Donald A. Schon, formerly of Arthur D. Little, Inc., Cambridge, Mass. The director of the Clearinghouse is Bernard M. Fry, formerly with the National Science Foundation and Atomic Energy Commission.

In addition to providing research information to industry, the Clearinghouse is designed to reduce duplication in both industry and Government in research and information processing. Savings to the Government of about $500,000 will be realized during the first year of operation as a result of reducing duplication of document processing and distribution within the Government.

A major step in this direction was a recent agreement between the Department of Commerce and the Department of Defense whereby the Clearinghouse assumed the task of processing all unclassified/unlimited DoD research reports, as well as reproduction and distribution of these documents to both the public and DoD agencies and contractors.

Hereafter, orders for documents formerly handled by OTS should be addressed to Clearinghouse, U. S. Department of Commerce, Springfield, Va. 22151.

AEC ENGINEERING DRAWINGS AVAILABLE FROM THE CLEARINGHOUSE

The U. S. Atomic Energy Commission collection of engineering drawings, associated specifications and photographs, has been transferred to the Clearinghouse, U. S. Department of Commerce, for reproduction and sale to the public.

There are approximately 67,000 items in the collection, with an anticipated increase of 10,000 per year. These engineering materials cover equipment and processes developed in AEC research.

These items are listed in Engineering Materials List, TID 4100, which is available on request from USAEC, Division of Technical Information Extension, P. O. Box 62, Oak Ridge, Tennessee 37831. New drawings are announced in both Nuclear Science Abstracts (NSA) and in the U. S. Government Research and Development Reports (USGRDR) beginning with this issue.

Drawings will be reproduced as blue line prints at a price of 3 1/2 cents a square foot. Photographs of associated engineering materials will be reproduced as glossy, continuous tone photographic prints, 8" x 10", at 20 cents each. Information may be obtained from the Clearinghouse on microcopy reproduction.

GOVERNMENT-OWNED PATENTS ARE ANNOUNCED IN USGRDR

Beginning with this issue USGRDR is announcing in abstract form current Government-owned patents released for use by the public on a non-exclusive and royalty-free basis. Many companies already are manufacturing products or using processes based on previously announced patents.

Abstracts, appearing in the other Research Reports and Related Material Section, will present an idea of the essentials of an invention. If the reader is interested in one of the inventions after studying the abstracts, a copy of the specifications can be obtained for 25 cents from the Commissioner of Patents. A license for free use of the patent can be applied for to the Government agency administering the patent. The PATENT ABSTRACT SERIES publications formerly published by the Office of Technical Services have been discontinued.

OTS TECHNICAL REPORTS NEWSLETTER DISCONTINUED

The OTS Technical Reports Newsletter has been discontinued. The Superintendent of Documents, U. S. Government Printing Office is making the necessary adjustments to subscriptions. It is suggested that Newsletter subscribers write to the Clearinghouse to obtain an application form for a new "Fast Announcement Service" through which selected documents are brought to the attention of industry. These special announcements cover the type of material previously published in the Newsletter. There is no charge for this service.

AEC REPORTS PRICE LIST DISCONTINUED

The semi-annual AEC Research Reports Price List has been discontinued. The last issue was No. 41, dated February, 1964. This special service has been discontinued in the interest of economy, especially in view of the fact that information relating to availability of AEC documents is reported adequately through Nuclear Science Abstracts and its indexes, and through the reference services of the Clearinghouse provided to the public.

NOTICE TO SUBSCRIBERS

Retroactive Pricing Rescinded

The new Standard Pricing Schedule announced in the August 20, 1964, issue of this publication was intended to eliminate dual pricing, and to provide a uniform, stable basis for the purchase of reports -- with an overall price reduction of about one-third. The retroactive feature of the announcement, however, has resulted in delays, excessive correspondence, and confusion in filling orders for reports. Therefore, in the interest of improving service, retroactive pricing is being cancelled. Accordingly, the earlier announcement is revised as follows:

1. All reports available through the Clearinghouse will be sold at the individual prices announced in U. S. Government Research and Development Reports since July 1, 1961.
2. Reports announced in issues prior to July 1, 1961, will continue to be available at a cost of photo-reproduction from the Library of Congress, Photoduplication Service Section.

Standard Price Schedule for Original or Reproduced Copies (HC)

Pages	
1 - 25	$1.00
26 - 50	2.00
51 - 100	3.00
101 - 150	4.00
151 - 200	5.00
201 - 300	6.00
301 - 400	7.00
401 - plus	7.00 plus .01 per page in excess of 400 pages

The Clearinghouse has changed its system of microphotography from microfilm to microfiche (a unitized sheet form of microphotography). All documents announced by the Clearinghouse subsequent to July 15, 1964, are available either in original, reproduced, or microfiche copy only.

The Clearinghouse will use the International Standard size of microfiche sheet of 105 mm. x 148 mm. (approximately 4" x 6"). Image size will be generally an 18:1 reduction. If a document contains 57 pages or less, normally only one sheet of microfiche will be necessary. "Trailer cards," or cards in addition to the first will be used for the additional pages.

Standard Price Schedule for Microfiche (MF)

Method of Purchase	Microfiche Price
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Automatic Distribution* (by Issuing Agency), e.g., all NASA, all AEC, all DDC, etc.	$ .40 for 1st sheet plus .25 for each trailer sheet
Automatic Distribution of all reports or all translations available from Clearinghouse in microfiche	$ .25 for 1st sheet plus .25 for each trailer sheet
Additional copies of the same document requested with the original order	$ .25 for 1st sheet plus .25 for each trailer sheet

*Automatic distribution by subject category, through advance subscription, will be announced in the near future.

Pricing schedules for sale of magnetic (computer) tapes, new journals, catalog cards, fee literature searches, and other bibliographic materials will be announced later.

Prices

The Clearinghouse has always been required by Public Law 776 to operate its document and distribution program on a self-supporting basis. For some time, the Clearinghouse has had one price for printed documents and another for documents reproduced by "blow-back" from microfilm. In order to establish a single pricing schedule, and one which will return costs of reproduction and handling, the agency has established a new price for all original or reproduced documents. They are on the average 1/3 lower than the previous pricing schedule, as shown by the following table.

Price Comparison of New Standard Price with Present Dual Pricing Schedule

Pages	% Sales	Printed	Xerox	Average Present Price	New Standard Price
1 - 25	41.5	$ .50	$ 2.10	$ 1.30	$ 1.00
26 - 50	21.3	.75	4.60	2.68	2.00
51 - 100	16.5	1.50	8.60	5.05	3.00
101 - 150	7.0	2.50	11.00	6.75	4.00
151 - 200	5.5	3.00	13.50	8.25	5.00
201 - 300	4.8	3.50	18.50	11.00	6.00
301 - 400	1.2	5.00	21.00	13.00	7.00
401 - plus	2.2	6.00 plus	22.75 plus	14.38 plus	7.00 plus .01/page in excess of 400 pages

SPECIAL NOTICE:

Temporarily Clearinghouse prices will be identified as OTS prices in each entry.

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FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. government agencies and provides reference, interlibrary loan, and reporduction services.

Carnegie Library of Pittsburgh
4400 Forbes St.
Pittsburgh, Pa. 15213

Columbia University
Engineering Library
Seeley W. Mudd Building
New York, N. Y. 10027

Georgia Institute of Technology
Price Gilbert Library
Atlanta, Ga. 30300

The John Crerar Library
35 West 33rd St.
Chicago, Ill. 60616

Library of Congress
Science and Technology Division
Washington, D. C. 20540

Linda Hall Library
5109 Cherry Street
Kansas City, Mo. 64100

Massachusetts Institute of Technology
M. I. T. Libraries
Cambridge, Mass. 02139

Southern Methodist University
Science Library
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Dallas, Texas 75222

University of California
General Library
Berkeley, Calif. 94704

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
Seattle, Wash. 98105

CUMULATIVE INDEXES

The following Cumulative Indexes for U. S. Government Research and Development Reports (formerly U. S. Government Research Reports) are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 38	Annual Cumulative Index January - December 1963 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Cumulated Index May - December 1963 Includes Technical Abstract Bulletin only.	$3.50
	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50
Volume 37	Annual Cumulative Index January - December 1962 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 36	July - December 1961	$3.50
Volume 35	January - June 1961	$1.00
Volume 34	July - December 1960	$1.00
Volume 33	January - June 1960	$1.00
Volume 32	July - December 1959	$1.00

For information regarding the availability of earlier indexes write to the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151.

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-608 049 Div. 1, 13, 28
OTS Prices: HC $2.00/MF $0.50

Human Sciences Research, Inc., McLean, Va.
AIRPORT/HELIPORT MARKING AND LIGHTING SYSTEMS: A SUMMARY REPORT ON HUMAN FACTORS RESEARCH.
Final rept.,
by J. A. Whittenburg, W. S. Vaughan, Jr., M. D. Havron, and C. R. Gavonius. Jun 64, 36p HSR-RR-64/2-MKX
Contract FAA BRD401, Proj. 424 2R
FAA rd64 94

Unclassified report

Descriptors: (*Landing fields, Marker lights), (*Marker lights, Landing fields), Airports, Landing aids, Approach lights, Airplanes, Helicopters, Jet planes, Pilots, Flight testing, Flight simulators, Aviation personnel, Aviation safety, Human engineering.

Six recently completed research tasks concerned with human factors considerations in airport/heliport marking and lighting systems are summarized. The research tasks included (1) surveys of prior operational flight tests, human factors data, and past, present, and proposed marking and lighting components and systems, (2) studies contributing to the development of airport/heliport marking and lighting designs, and (3) studies contributing to the screening and evaluation of proposed airport/heliport marking and lighting systems. For each summary the significance of the study to airport/heliport marking and lighting systems is stated. This is followed, in order, by a brief description of the study procedure, the major study findings, and implications that these findings may have for management and operational personnel as well as for human factors specialists. In addition to the summaries the broader implications of the total research effort are discussed.

AD-608 050 Div. 1, 13, 28
OTS Prices: HC $5.00/MF $1.25

Human Sciences Research, Inc., McLean, Va.
FLIGHT ANALYSIS OF APPROACH AND LANDING GUIDANCE ELEMENTS OF HELIPORT LIGHTING PATTERNS.
Final rept.,
by David L. Watters, Wallace F. Rollins, Roger B. Frey, and Carl R. Cavonius. Jun 64, 200p
HSR-RR-64/7-MkX
Contract FAA BRD401, Proj. 424 2R
FAA RD64 93

Unclassified report

Descriptors: (*Helicopters, Landing aids), (*Landing aids, Helicopters), Landing fields, Airports, Marker lights, Approach lights, Flight paths, Flight testing, Pilots, Aviation safety, Human engineering, Instrumentation, Programming (Computers).

The flight phase of a series of tasks directed at the development of preliminary design criteria for approach and landing guidance elements of a heliport lighting configuration is presented. Helicopter pilots flew approaches to 8 experimental lighting and marking patterns. The patterns included a brightly colored panel presented during daylight approaches and 7 night patterns consisting of a single touchdown light or pairs of lights spaced 5, 15, or 80 feet apart oriented along the flight path or transverse to the flight path. Seventy-two measures of aircraft position, aircraft attitude and pilot control movement were analyzed in order to identify measures sensitive to changes in lighting configuration, but insensitive to individual pilot technique. Those measures which successfully discriminated among different lighting conditions were measures of deviation from a generally accepted standard (e. g., a straight flight path during approach) as opposed to measures which reflect individual pilot technique. The vast majority of the recorded measures (particularly pilot control movement) reflected inter-pilot differences in technique, since individual pilots display great consistency when repeating the same pattern.

AD-608 098 Div. 1, 14
OTS Prices: HC $3.00/MF $0.75

Schjeldahl (G.T.) Co., Northfield, Minn.
POLYPROPYLENE BALLOON STUDY.
Annual rept.,
by J. A. MacFadden. 29 Oct 64, 83p
Contract Nonr4096 00

Unclassified report

Descriptors: (*Balloons, Polyethylene plastics), (*Polyethylene plastics, Balloons), Feasibility studies, Plastics, Balloon equipment, Tests, Friction, Model tests, Seals (Stoppers), Sealing compounds, Tapes, Plastic seals, Casting, Extrusion, Manufacturing methods, Tensile properties, Permeability, Infrared radiation, Stresses.

The project purpose was to: (1) conduct a theoretical design study of a polypropylene balloon, a testing program to evaluate fittings and material, model balloon tests, a full-scale static inflation test and (2) fabricate and flight test a 5000-pound payload balloon after completion of (1) and upon receipt of written instructions from the Scientific Officer. Item (1) has been completed. Evaluation of the premature failure of the full-scale static test balloon shows that although fabrication of a polypropylene balloon is possible, there are still fabrication techniques that need further study. It is possible to seal gores together using GT-301 tape. Laboratory samples of inflation tubes and duct accessories are good. However, on the basis of present knowledge, it is not certain that it is economically practical to fabricate an unsupported polypropylene balloon and work on the contract was suspended. It was proposed that the funds remaining on Nonr-4096(00) be directed to the perfection of a reinforced Mylar (GT-66). (Author)

AD-608 185 Div. 1, 9
OTS Prices: HC $4.00/MF $1.00

Dynasciences Corp., Fort Washington, Pa.

DOWNWASH IMPINGEMENT DESIGN CRITERIA FOR VTOL AIRCRAFT.
Technical rept. for Jul 63-Mar 64,
by M. M. George, A. A. Perlmutter, and L. J. Butler.
Aug 64, 137p DCR-139
Contract DA44 177AMC65T, Task 1D121401A14129
TRECOM TR64 48

Unclassified report

Descriptors: (*Vertical take-off planes, Design), (*Downwash, Vertical take-off planes), Terrain, Particles, Inhibition, Vision, Pilots, Damage, Jets, Performance (Engineering), Aviation accidents, Propellers (Aerial), Pressure.

The objective of the program was to utilize existing data for the preparation of design charts for VTOL aircraft to aid in the establishment of aircraft designs that will alleviate the adverse operational conditions resulting from downwash impingement on terrain. Specific areas of investigation included particle entrainment and ingestion and their effect on pilot vision, aircraft damage, personnel injury, and aircraft signature. Methods to quantitatively predict operational conditions resulting from downwash impingement of a VTOL aircraft are presented. (Author)

AD-608 186 Div. 1, 9
OTS Prices: HC $4.00/MF $1.00

Dynasciences Corp., Fort Washington, Pa.
EFFECTS OF PROPELLER SLIPSTREAM ON V/STOL AIRCRAFT PERFORMANCE AND STABILITY.
Technical rept. for 24 Apr 63-24 Mar 64,
by L. Goland, N. Miller, and L. Butler. Aug 64, 129p
DCR-137
Contract DA44 177AMC48T, Task 1D121401A14203
TRECOM TR64 47

Unclassified report

Descriptors: (*Short take-off planes, Performance (Engineering)), (*Vertical take-off planes, Performance (Engineering)), (*Propellers (Aerial), Aerodynamic characteristics), (*Wings, Aerodynamic characteristics), Aerodynamic loading, Aerodynamic configurations, Take-off, Landings, Control, Stability, Mathematical analysis, Lift, Drag, Delta wings, Flight, Theory, Stalling.

Presented is an analytical investigation of the aerodynamic forces acting on wing-propeller combinations including the effects of propeller slipstreams. The results of the developed theory are then applied to typical two- and four-propeller VTOL and STOL wing configurations. Correlation with existing test data is shown to be satisfactory. Consideration is also given to such associated items as the effects of the slipstream on (1) wing stall (2) aircraft take-off and landing performance and (3) aircraft stability and control. (Author)

AD-608 187 Div. 1, 9, 27
OTS Prices: HC $3.00/MF $0.75

Mississippi State Univ., State College.
THE MARVEL PROJECT, PART C. AN INVESTIGATION OF THE SHROUDED PROPELLER PROPULSIVE SYSTEM ON THE MARVELLETE AIRCRAFT.
Aerophysics research rept. no. 48,
by Sean C. Roberts. Aug 64, 85p
Contract DA44 177AMC892T, Task 1D121401A14203
TRECOM TR64 41

Unclassified report

See also AD-426 788.

Descriptors: (*Shrouded propellers, Design), Thrust, Boundary layer control, Propellers (Aerial), Airfoils, Aerodynamic characteristics, Performance (Engineering), Flight tests.

The object of this report is to develop a reasonably accurate method of designing a shrouded propeller for thrust augmentation. The full scale flight results of shrouded propeller as a pusher type aircraft are presented and compared with the equivalent free propeller and the theoretical results developed from existing theories. The theoretical methods of shrouded propeller design and performance predictions outlined in the report are adequate even though the results tend to be rather optimistic. The static thrust of the shrouded propeller configuration was found to be approximately 100 percent greater than the static thrust of the equivalent open propeller driven by the same horsepower engine. Although the shroud increment of the thrust decreases with an increase in forward velocity the breakeven velocity in this particular configuration was considerably greater than 100 miles per hour. (Author)

AD-608 188 Div. 1, 30
OTS Prices: HC $2.00/MF $0.50

Army Transportation Research Command, Fort Eustis, Va.
SUPPLEMENTARY STUDY OF DESIGN FACTORS IN AIR DELIVERY FOR CV-7 CARIBOU AIRCRAFT,
by R. D. H. Jones. Aug 64, 35p
Task 1D643324D59806
TRECOM TR64 46

Unclassified report

Descriptors: (*Transport planes, Design), (*Containers, Motion), Cargo, Cargo parachutes, Air drop operations, Short take-off planes, Floors, Friction, Stability, Loading (Mechanics), Vector analysis, Safety, Gusts, Handling, Programming languages.

A study was made of the extraction of loads by parachute from the CV-7 Caribou aircraft. Two FORTRAN programs are included to show the calculation of the maximum safe envelope for the loads; various conditions with a wide range of adjustable parameters are considered. In the programs, the parameters may be set as data to simulate any values, such as those for the extractive force of the ejection parachute, for the coefficient of sliding friction between the floor and the load, and for the length of the pallet on which the load is mounted. The conclusions reached are negative in character, but they can be of value as a basis for further studies. The load tips so little at the sill of the floor with the ramp up that the maximum safe envelope departs only slightly from the rectangular form. It is believed that the effects of gust disturbances and of possible jamming in the rail restraint and release system should be investigated, since, from time to time, these influences will cause the load to tip through angles of inclination of a higher order of magnitude than those due to dynamical considerations. (Author)

AD-608 189 Div. 1
OTS Prices: HC $3.00/MF $0.75

Aviation Safety Engineering and Research, Phoenix, Ariz.
PERSONNEL RESTRAINT SYSTEMS STUDY UH-1A AND UH-1B BELL IROQUOIS HELICOPTERS; SUPPLEMENT.
Mar 64, 64p AvSER-62-27
Contract DA44 177AMC888T, Task 1A024701A12101
TRECOM TR63 81suppl.

Unclassified report

Rept. on Crash Injury Evaluation.

Descriptors: (*Aviation safety, Safety harness), (*Safety harness, Helicopters), (*Helicopters, Safety harness), (*Mechanical drawings, Safety harness), Specifications, Fuselages, Cockpits, Seats, Locking fastener devices, Loading (Mechanics), Shear stresses, Installation, Design, Reinforcing materials.

Contents: Installation of personnel restraint system; Installation of lap belt tie-down strap (pilot's and copilot's seat); Modification of aft carriage attachment (crew seat); Guide rod assembly (seat back and pilot's shoulder harness); Doubler--inertia reel installation; Dust cover--inertia reel strap; Installation of inertia reel and access through lower panel; Floor modification (left-hand side); Floor modification (right-hand side); Control cable installation and bolt replacement (crew seat); Detail and installation of reinforcement tube (seat rail (front)); Detail and installation of reinforcement tube (seat rail (back)); Reinforcement and replacement of rear tracks; Modification of troop lap belt attachment fittings; Installation of personnel restraint system; Lap belt tie-down strap; and Pilot's tie-down strap.

AD-608 192 Div. 1
OTS Prices: HC $3.00/MF $0.75

Aviation Safety Engineering and Research, Phoenix, Ariz.
PERSONNEL RESTRAINT SYSTEMS STUDY, UH-1A AND UH-1B BELL IROQUOIS HELICOPTERS,
by Joseph L. Haley, Jr. and James P. Avery. Mar 64, 58p AvSER-62-27
Contract DA44 177AMC888T, Task 1A024701A12101
TRECOM TR63 81
Unclassified report

Descriptors: (*Aviation safety, Safety harness), (*Safety harness, Helicopters), (*Helicopters, Safety harness), Aviation personnel, Fuselages, Cockpits, Specifications, Costs, Weight, Transport planes, Shear stresses, Loading (Mechanics), Locking fastener devices, Equations.

Detailed recommendations for the improvement of the personnel restraint system in the U. S. Army UH-1A and UH-1B aircraft are presented. The recommendations pertain primarily to strengthening the existing restraint system components. The modifications proposed indicate the following strength improvements: (1) Cockpit - The crew's restraint system is increased from a 10-12G value to a 20-25G value; (2) Troop Compartment - The troops' lap belt attachments are increased from a 12-15G value to a 22-25G value. The above strength increases can be achieved with a weight increase of 7 pounds per aircraft and a cost of approximately $70 per aircraft. The following information is included in this report and the Supplement: (1) Engineering - strength analysis of proposed modifications; (2) Parts Procurement - detailed engineering drawings with a bill of materials from which retrofit kits can be procured; (3) Parts Manufacture - drawings necessary for the manufacture of retrofit kits; (4) Retrofit Kit Installation - sufficient drawings for installation of the retrofit kits by Army personnel; and (5) Administrative - a cost and weight summary of proposed modifications. (Author)

AD-608 193 Div. 1, 4, 8
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
SURFACE CHEMICAL METHODS OF DISPLACING WATER AND/OR OILS AND SALVAGING FLOODED EQUIPMENT. PART 3. FIELD EXPERIENCE IN RECOVERING EQUIPMENT AND FUSELAGE OF HH 52A HELICOPTER AFTER SUBMERSION AT SEA.
Interim rept.,
by H. R. Baker and P. B. Leach. 19 Oct 64, 25p
Proj. SR007 08 04, Task 0617
NRL 6158
Unclassified report

See also AD-265 487.

Descriptors: (*Salvage, Helicopters), (*Surface-active substances, Effectiveness), (*Helicopters, Salvage), (*Electronic equipment, Salvage), Electrical equipment, Recovery, Fuselages, Sea rescues.

The surface chemical techniques previously developed in this Laboratory for the removal of oily and/or electrolyte contamination and the displacement of water from electrical and electronic equipment has been applied to the recovery of the equipment and fuselage of an HH 52A Sikorsky helicopter after immersion in sea water. Satisfactory methods were established for reconditioning the fuselage and wiring harness and other equipment attached to it. (Author)

AD-608 227 Div. 1, 26
OTS Prices: HC $3.00/MF $0.75

Republic Aviation Corp., Farmingdale, N. Y.
INVESTIGATION OF PULSATING FLOW HYDRAULIC CONCEPTS.
Quarterly progress rept. no. 2.
15 Nov 64, 80p RAC-1932-2, RD-TR-64-824
Contract AF33 615 1582, Proj. 8128, Task 812807
Unclassified report

Descriptors: (*Flight control systems, Hydraulic systems), (*Hydraulic systems, Design), Systems engineering, Analysis, Flight control systems, Specifications, Instrumentation, Fluid flow.

Detail designs were made for all of the components which are peculiar to pulsating flow hydraulic systems except the alternator valve, which is in design. Comparative system studies were made of two typical continuous flow hydraulic systems and their pulsating flow hydraulic counterparts. (Author)

AD-608 242 Div. 1
OTS Prices: HC $5.00/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVELOPMENT OF AIRCRAFT,
by Viktor Fedorovich Bolkhovitinov. 14 Aug 64, 166p
FTD MT64 150; TT 65 60016
Unclassified report

Edited machine trans. of mono. Puti Razvitiya Letatel'nykh Apparatov, Moscow, 1962, 130p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aeronautics, History), Aircraft, Flight speeds, Aerodynamic characteristics, Helicopters, Airframes, Fighters, Aerial warfare, Aircraft guns, Design, Aircraft engines, Armament, Production, Probability, Equations, Rockets, USSR.

Contents: Equation of existence; Initial period of existence of aviation; Formation of aviation (1909--1914); Aviation in the first world war; Criteria of effectiveness of aviation; Development of aviation in the period 1918-1939; Main factors of the progress of speed; Cause

of changes of main factors of combat efficiency of aircraft; Equation of state of production of aircraft; Development of aviation 1939-1959; and Development of one-shot winged and ballistic vehicles.

AD-608 253 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR INTERNATIONAL AIRPORT, MIAMI, FLORIDA.
Final rept.
Jun 64, 86p
Proj. 114 20R
FAA RD64 54 V20

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-605 174.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Florida, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 254 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR MOISANT INTERNATIONAL AIRPORT, NEW ORLEANS, LOUISIANA.
Final rept.
Jun 64, 86p
Proj. 114 20R
FAA RD64 54 V22

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-608 253.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Louisiana, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 255 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR MUNICIPAL AIRPORT, RENO, NEVADA.
Final rept.
Jun 64, 86p
Proj. 114 20R
FAA RD64 54 V24

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-608 254.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Nevada, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 256 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR INTERNATIONAL AIRPORT (MALTON), TORONTO, ONTARIO.
Final rept.Jun 64, 86p
Proj. 114 20R
FAA RD64 54 V26

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-608 255.

Descriptors: (*Climat logy, All-weather aviation), (*All-weather aviation. Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Ontario, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 257 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR STAPLETON AIRFIELD, DENVER, COLORADO.
Final rept.
Jun 64, 86p
Proj. 114 20R
FAA RD64 54 V31

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-608 256.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Colorado, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind

and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 265 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR STANDIFORD FIELD, LOUISVILLE, KENTUCKY.
Final rept.
Jun 64, 85p
Proj. 114 20R
FAA RD64 54 V21

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 256.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Kentucky, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 266 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR MIDWAY AIRPORT, CHICAGO, ILLINOIS.
Final rept.
Jun 64, 85p
Proj. 114 20R
FAA RD64 54 V23

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 265.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Illinois, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 267 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR METROPOLITAN AIRPORT, DETROIT, MICHIGAN.
Final rept.
Jun 64, 85p
Proj. 114 20R
FAA RD64 54 V28

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 266.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Michigan, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 268 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR GREATER PITTSBURGH AIRPORT, PITTSBURGH, PENNSYLVANIA.
Final rept.
Jun 64, 85p
Proj. 114 20R
FAA RD64 54 V30

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 267.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Pennsylvania, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 285 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR SEATTLE-TACOMA AIRPORT, SEATTLE, WASHINGTON.
Final rept.
Jun 64, 86p
Proj. 114 20R
FAA RD64 54 V29

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 268.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Airports, Landing fields, Washington, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 305 Div. 1, 9
OTS Prices: HC $2.00/MF $0.50

Minnesota Univ., Minneapolis.
PRESSURE DISTRIBUTION MEASUREMENTS OF CONVENTIONAL RIBBON PARACHUTES IN SUPERSONIC FLOW,
by Eugene L. Haak and Ronald J. Niccum. Sep 64, 36p
Contract AF33 616 8310, Proj. 6065, Task 606503
ASD TDR63 662

Unclassified report

Jointly sponsored by the Dept. of the Army and the Dept. of the Navy.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ribbon parachutes, Aerodynamic characteristics), Models (Simulations), Parachutes, Pressure, Distribution, Supersonic flow, Test methods, High-speed photography, Wind tunnels, Experimental data.

Conventionally shaped ribbon parachutes do not function satisfactorily as aerodynamic decelerators in supersonic flow. Their unstable behavior is particularly objectionable. To determine the cause of this structural and dynamic instability, a series of pressure distribution measurements were made on ribbon parachutes at Mach numbers of 0.8, 1.08, 1.2, 3.0, and 4.5. The results of measurements and attempts to indicate the effect of suspension lines and forebodies on the pressure distribution of the parachute canopy are presented. (Author)

AD-608 375 Div. 1, 7, 33
OTS Prices: HC $3.00/MF $0.75

Nation Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF VISUAL AIDS FOR HELIPORTS.
Final rept.,
by Robert F. Gates. Jun 64, 58p
Proj. 424 001 01V
FAA RD64 89

Unclassified report

Descriptors: (*Landing aids, Helicopters), (*Helicopters, Landing aids), (*Lighting equipment, Landing fields), Night landings, Terminal flight facilities, Approach lights, Marker lights, Beacon lights, Flood lights, Pilots, Visual perception, Tests.

The lighting configurations were designed and equipment installed under the supervision of Federal Aviation Agency personnel. The visual aids evaluated consisted of perimeter lighting, floodlighting, approach lighting and identification beacons. Emphasis was placed upon selection of an acceptable minimum size approach light pattern in view of the requirement for standardizing these for ground and roof-top heliports. It was concluded that suitable heliport perimeter lighting would consist of yellow lights, spaced not more than 40 feet apart on each side of the heliport and that suitable floodlighting would consist of fixtures located close to the touchdown area. It was also concluded that prior to establishing a heliport approach lighting standard, additional information was required relative to approach lights designed for heliport use, to the inflight control of light intensity and to the use of higher helicopter approach angles. It was recommended that the results of this evaluation be utilized in preparing a Selection Memorandum for heliport perimeter lighting and floodlighting and that further investigations be conducted into the problems encountered and requirements for approach lighting. (Author)

AD-608 376 Div. 1
OTS Prices: HC $3.00/MF $0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF HONEYWELL MODEL 7182 RADAR ALTIMETER.
Final rept.,
by Edmund A. Zyzys. Jun 64, 80p
Proj. 114 023-01V
FAA RD64 95

Unclassified report

Descriptors: (*Altimeters, Radar equipment), (*Flight instruments, Radar equipment), (*Radar equipment, Altimeters), Height finding, All-weather aviation, Landing aids, Radar navigation, Flight testing, Terrain avoidance, Feasibility studies, Experimental data.

An evaluation of the altimeter installed in a B-25 aircraft was conducted to determine the feasibility of using the Altimeter as an altitude and altitude-rate sensor for all-weather landing applications. The Altimeter, a tracking-pulse radar, employed a leading-edge tracker to develop d-c voltages analogous to altitude and altitude rate. The evaluation included both flight tests and laboratory tests. Altitude and altitude-rate accuracies were determined from 186 data runs over runway terrain and water. Phototheodolites and ground elevation surveys were used to determine aircraft altitude-above-terrain. Altitude-rate data were obtained from phototheodolite space-position and time data. Altimeter outputs were recorded on an airborne oscillograph and correlated in time with phototheodolite data. Altimeter performance was also checked over approach lights, grass, trees, dirt, and buildings. It was concluded that it was feasible to use the altimeter as an altitude and altitude-rate sensor for all-weather landing applications. It was recommended that the deficiencies detected during the evaluation be corrected and that the altimeter be operationally evaluated in an aircraft equipped with an all-weather landing system.

AD-608 390 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR INTERNATIONAL AIRPORT (DORVAL) MONTREAL, QUEBEC.
Final rept.
Jun 64, 84p
Proj. 114 20R
FAA RD64 54 V27

Unclassified report

See also AD-608 285.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Landing fields, Airports, Quebec, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data

for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 391 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR INTERNATIONAL AIRPORT, ANCHORAGE, ALASKA.
Final rept.
Jun 64, 84p
Proj. 114 20R
FAA RD64 54 V32

Unclassified report

See also AD-608 390.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Landing fields, Airports, Alaska, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 394 Div. 1, 2
OTS Prices: HC $6.00/MF $1.25

Sperry Gyroscope Co., Great Neck, N. Y.
ALL-WEATHER LANDING DISPLAY FOR DC-7.
Final rept.
Jun 64, 233p HB-9202-0074
Contract FA WA4449, Proj. 114 15D
FAA RD64 71

Unclassified report

Descriptors: (*Display systems, All-weather aviation), (*All-weather aviation, Display systems), (*Landing aids, All-weather aviation), Instrument panels, Instrument landings, Flight instruments, Flight speed indicators, Altimeters, Course indicators.

An all-weather landing display in FAA's DC-7 aircraft number N464 was installed. The purpose of the display system is to enable the captain to monitor automatic landings and to provide manual landing capability under low-visibility conditions. The report contains a description of the display system and components, modifications performed on the DC-7, operational procedures, system bench test results, ground and flight test plans. It is concluded that the DC-7 is well equipped for flight test as an all-weather display test bed, and recommended that system modifications and simplification be incorporated progressively as flight tests indicate their feasibility. (Author)

AD-608 415 Div. 1, 2
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
HIGH-ALTITUDE MINIMUM-WIND FIELDS AND BALLOON APPLICATIONS.
Environmental Research Papers,
by George F. Nolan and Ralland A. Smith. Oct 64, 28p
Proj. 6665
AFCRL 64 834; AFCRL ERP64

Unclassified report

Descriptors: (*Wind, Aeronautics), (*Balloons, Flight paths), Atmospheric motion, Stratosphere, North America, Transport properties, Meteorological balloons, Meteorological parameters, Meteorological charts.

During the summer months, a relatively stable layer of minimum winds exists in the lower stratosphere above the North American continent between latitudes 25N and 65N. Within the layer there are levels where the wind speed is close to zero. These phenomena can be utilized for balloon operations that require flights of long duration with minimum horizontal displacement from a fixed geographic location, and for high-altitude tethered-balloon operations that require float altitudes where dynamic pressure is minimum. (Author)

AD-608 419 Div. 1, 2
OTS Prices: HC $3.00/MF $0.75

National Weather Records Center, Asheville, N. C.
CLIMATIC STUDIES FOR PROPOSED LANDING SYSTEM FOR NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER, ATLANTIC CITY, NEW JERSEY.
Final rept.,
by Norman L. Canfield, Oliver M. Davis, Grady F. McKay, James D. Matthews, and Charles W. Thomason, Jr.
Jun 64, 84p
Proj. 114 20R
FAA RD64 54 V25

Unclassified report

See also AD-608 390.

Descriptors: (*Climatology, All-weather aviation), (*All-weather aviation, Landing aids), (*Landing aids, All-weather aviation), Landing fields, Airports, New Jersey, Meteorological parameters, Tables.

This report is one of 32 volumes of climatological data for 32 different major airports. Ceiling, visibility, wind and weather information is grouped seasonally and by various periods of the day. Various weather categories are tabulated, in most cases from 10 years of data, to act as an aid in making decisions affecting the landing systems at these 32 air terminals. (Author)

AD-608 439 Div. 1, 14
OTS Prices: HC $1.00/MF $0.50

Air Force Flight Dynamics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
PHILOSOPHY FOR THE DESIGN OF PRIMARY AIRCRAFT STRUCTURES WITH FIBROUS REINFORCED COMPOSITES (FRC),
by Ralph L. mcGuire, Jr. Nov 64, 17p
Proj. 1368, Task 136810
FDL FDTS64TM41

Unclassified report

Descriptors: (*Airframes, Composite materials), (*Composite materials, Airframes), Reinforcing materials, Fibers, Glass textiles, Plastics, Laminated plastics, Fatigue (Mechanics), Failure (Mechanics), Filament wound construction, Sandwich panels, Honeycomb cores, Structural properties, Aerodynamic characteristics, Loading (Mechanics), Airfoils.

The contents of this report are presented to emphasize a possible approach to establishing useable design philosophies for utilizing Fiber Reinforced Composites for major airframe components. It outlines the general nature of these materials with accompanying thoughts for assessing the material characteristics. Advantages and disadvantages of these materials are listed, with more emphasis on areas of needed research. An attempt is made to associate these research areas with the appropriate technical field of interest.

AD-608 451 Div. 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF FIRING ROCKET SHELLS ON THE PERFORMANCE OF TURBOJET POWER PLANT,
by J. Szymankiewicz. 12 Nov 64, 10p
FTD TT64 388; TT 65 60120

Unclassified report

Unedited rough draft trans. of Wojskowy Przeglad Lotniczy (Poland) 1963, no. 8, p. 22-26.

Descriptors: (*Turbojet engines, Performance (Engineering)), (*Rocket motors, Operation), Compatibility, Aircraft ammunition, Rockets, Launching, Axial flow compressors, Dynamics, Thermal properties, Chemical properties, Mathematical analysis, Fuel, Control.

The effects of firing rocket ammunition on the performance of axial flow turbojet engines are considered. The causes and effects of rocket launchings from airborne aircraft are discussed. Several recommendations for the prevention of these problems are given. The dynamic, thermal, and chemical effects on the performance of the power plant are described.

AD-608 470 Div. 1
OTS Prices: HC $3.00/MF $0.75

Bell Aerosystems Co., Buffalo, N. Y.
MEASUREMENT OF ANGULAR DISPLACEMENTS OF PRACTICAL WING STRUCTURES BY THE MOIRE' FRINGE TECHNIQUE,
by Joseph Padlog and Richard H. Gallagher. Sep 64, 50p
Contract AF33 657 7486, Proj. 8219, Task 821901
FDL TDR64 42

Unclassified report

Descriptors: (*Wings, Aeroelasticity), (*Aeroelasticity, Measurement), Feasibility studies, Swept wings, Photographic techniques, Surfaces, Configuration, Models (Simulations), Lift.

Results of a study of the feasibility of employing the Moire' fringe technique in the measurement of angular displacements of practical wing structures are presented. Slope influence coefficients obtained from Moire' fringe patterns determined from a square cantilever plate and a swept wing model are compared with available theoretical and experimental data. (Author)

2. Astronomy, Geophysics and Geography

AD-608 028 Div. 2, 12, 20
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
IONIZING RADIATION DETECTED BY PIONEER II,
by Alan Rosen, Paul J. Coleman, Jr., and
C. P. Sonett. 6 May 59, 8p

Unclassified report

Descriptors: (*Cosmic rays, Analysis), (*Space environmental conditions, Cosmic rays), Ionization, Radiation measurement systems, Protons, Space probles, Ionization chambers, Scientific satellites.

The total ionizing component of cosmic radiation was measured up to an altitude of 1550 Km. An upper bound to the ratio of average-to-minimum specific ionization was determined by comparing the ionization with the count-rate observations from the Explorer IV satellite. This result implied that protons are the predominant specie which gave rise to the observed ionization. (Author)

AD-608 058 Div. 2, 4, 25
OTS Prices: HC $3.00/MF $0.75

American Science and Engineering, Inc., Cambridge, Mass.
THE FLUORESCENCE OF AIR AND NITROGEN EXCITED BY 50 KEV ELECTRONS.
Final rept. for 15 Feb 61-31 Jan 64,
by Gilbert Davidson and Robert O'Neil. May 64, 66p
ASE-512
Contract AF19 604 8035, Proj. 7674, Task 76758 9
AFCRL 64 466

Unclassified report

Descriptors: (*Aurorae, Simulation), (*Air, Fluorescence), (*Nitrogen, Fluorescence), (*Electron Beams, Instrumentation), Electron bombardment, Spectroscopy, Line spectrum, Band spectrum, Electron guns, Vacuum systems, Photomultipliers, Design.

An electron bombardment system was constructed using the technique of differentially pumped chambers. A monoenergetic beam of electrons with energy up to 60 kev and current up to 5 ma can be obtained operating into a target chamber at 1 atmosphere of air or nitrogen. The relative integrated intensities of the various spectral components observed from air and nitrogen at pressures of 5, 200, and 600 Torr when bombarded by 50 kev electrons are reported. The spectral region 3200A to 10 800A was analyzed. The observation of several previously unobserved bands and lines of nitrogen is reported. (Author)

AD-608 068 Div. 2, 20
OTS Prices: HC $1.00/MF $0.50

Maryland Univ., College Park.
THE LATITUDE AND ALTITUDE DISTRIBUTION OF GEOMAGNETICALLY TRAPPED PROTONS.
Letter rept.,
by S. F. Singer. 17 Jun 60, 8p
Contract AF49 638 530
AFOSR TN60 747; PB 149 883

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Protons, Atmosphere), Distribution, Charged particles, Cosmic rays, Terrestrial magnetism, Injection, Particle trajectories, Nuclear physics, Geophysics.

A theory is derived for the proton injection coefficient and is use to calculate the latitude and altitude dependence. This theory is based purely on geometry and involves only the the fact that in the decay of the fast neutron the resulting proton preserves its direction.

AD-608 083 Div. 2, 12, 15, 16, 30
OTS Prices: HC $6.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COSMIC RESEARCH, 1964, VOL. 2, NO. 5.
4 Nov 64, 269p
FTD TT64 1077, TT 64 71679

Unclassified report

Unedited rough draft trans. of Kosmicheskie Issledovaniya (USSR) 1964, v. 2, no. 5, p. 657-813.
See also AD-605 513.

Descriptors: (*Satellites (Artificial), Trajectories), (*Space biology, Scientific research), (*Space flight, Scientific research), (*Space environmental conditions, Scientific research), Cosmic rays, Nuclear explosions, Least squares method, Celestial mechanics, Orbital trajectories, Spacecraft, Albedo (Astronomy), Animals, Stability, Perturbation theory, Electrons, Gravity, USSR, Astrophysics.

Collection of Russian reports dealing with flight of artificial satellites, problems of celestial mechanics, decay of albedo neutrons, effect of space flight on animals, and error estimates in determining parameters by the method of least squares.

AD-608 095 Div. 2, 12
OTS Prices: HC $5.00/MF $1.00

Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
TIROS PHOTOGRAPHS AND MOSAIC SEQUENCES OF TROPICAL CYCLONES IN THE WESTERN PACIFIC DRUING 1962,
by Robert W. Fett. Jul 64, 154p
WB-MSL 32

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Tropical cyclones, Photographs), (*Meteorological satellites, Photographs), Storms, Pacific Ocean, Photographic analysis, Meteorological parameters, Meteorological charts, Weather forecasting.

This report contains an extensive and nearly complete series of the TIROS views of the major tropical cyclones of the Western Pacific during 1962. The report is intended to be more than a catalogue of the various views obtained. The relationship of the appearance of the cyclone to flow patterns suggested by cirrus striations and the direction of shear of cumulonimbus anvils, for example, is discussed. The question of development and changes in appearance with changes in intensity are also described.

AD-608 101 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Travelers Research Center, Inc., Hartford, Conn.

WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Monthly progress rept. for Oct 64,
by Glyndon L. Lynde. Oct 64, 16p
Contract Cwb10704

Unclassified report

See also AD-430 444.

Descriptors: (*Weather forecasting, Data processing systems), (*Data processing systems, Weather forecasting), Data transmission systems, Meteorological instruments, Statistical analysis, Mathematical prediction, Ceiling, Visibility, Wind, Programming (Computers), Meteorological radar, Meteorology.

A progress report covering the following areas: (1) Medium-period terminal forecasting project; (2) Implementation project; (3) Digifax programming project; (4) Subsynoptic scale processes project; and (5) Approach zone weather studes project.

AD-608 126 Div. 2
OTS Prices: HC $2.00/MF $0.50

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
ANTARCTIC RESEARCH AND DATA ANALYSIS. AN ELECTRON BOMBARDMENT THEORY OF HIGH-LATITUDE SPORADIC-E.
Scientific rept. no. 17,
by S. M. Bennett and T. M. Noel. 25 Sep 64, 48p
RAD-TR-64 29
Grant NSF C255

Unclassified report

Descriptors: (*Electron density, Polar regions), Atmospheric electricity, Ionosphere, Geophysics.

On the basis of a power spectrum analysis of the foEs time series at the Antarctic stations Wilkes and Byrd, periodic tendencies of the order of hours were uncovered. The principal (and secondary) periods in hours are: Wilkes 1.7 (2.4) Byrd 2.2 (1.1). It is possible to derive a model of quasi-periodic variations which is related to the loss of electrons from the Van Allen radiation belt. Thin-layer sporadic-E results from the magnetospheric time-of-flight spectrometer effect when the source is longitudinally small. The periodicity of the resultant variation in electron density at a point longitudinally removed from the disturbance source (but on the same L-shell) is dependent upon the particle source spectrum and the Coulomb-scattering loss-coefficient and these factors are, at present, poorly understood. The longitude effect in high-latitude sporadic-E occurrence is ascribed to the longitudinal dependence of the effective loss coefficient for a particle whose mirror point drifts on a surface of constant magnetic field strength. (Author)

AD-608 138 Div. 2
OTS Prices: HC $3.00/MF $0.75

Anti-Submarine Warfare Lab., Naval Air Development Center, Johnsville, Pa.
TRANSIENT MICROPULSATIONS ASSOCIATED WITH GEOMAGNETIC BAYS AND EVIDENCES OF HYDROMAGNETIC ORIGIN IN THE EARTH'S OUTER ATMOSPHERE.
Phase rept.,
by Ronald P. Lepping. 12 Oct 64, 86p
Task FR30 3 05
NADC-AW 6419

Unclassified report

Descriptors: (*Solar atmosphere, Magnetic storms), (*Magnetic storms, Solar atmosphere), (*Terrestrial magnetism, Magnetic storms), Geophysics, Astrophysics.

This analysis comprised theory and experiment. A partial data analysis and correlation was performed on the pertinent characteristics of 374 pt-bays observed over a 2-year period. For first choice examples, the greatest density of occurrences took place around local midnight, and an unexpectedly high percentage of negative-polarity bays was particularly evident. Observations indicate that the bay-associated transient micropulsations are of hydromagnetic wave origin, with the most frequently occurring period of oscillation being 60 seconds. (Author)

AD-608 150 Div. 2
OTS Prices: HC $2.00/MF $0.50

Wisconsin Univ., Madison.
THE DISTRIBUTION OF STRING BOGS IN CENTRAL CANADA IN RELATION TO CLIMATE.
Technical rept. no. 14,
by Robert Knollenberg. Aug 64, 45p
Contract Nonr1202 07; Grant NSF-GP444, Proj. NR387 022

Unclassified report

Descriptors: (*Swamps, Canada), (*Climatology, Swamps), Terrain, Hydrology, Plants (Botany), Permafrost, Soil mechanics, Geography, Mapping.

The distribution of string bogs in Central Canada was mapped and compared with specific climatic parameters in the region to estimate their potential usefulness as climatic indicators. The string bog distribution was determined along a series of flight lines made during June and October, 1963. As a result of this and other studies the climatic dependence of string bog formation and development seems established. They are a true frost-soil form occurring with or without perma-frost. They are formed in a region where the precipitation exceeds evaporation and the freeze-thaw depths exceed 125 cm (calculated value). Within the string bog distribution the region of maximum development of string bogs coinciding with the maximum freeze-thaw depths.

AD-608 151 Div. 2, 16
OTS Prices: HC $3.00/MF $0.75

Wisconsin Univ., Madison.
AN OUTLINE OF MATERIALS FOR A POSTGLACIAL BIOCLIMATIC HISTORY OF KEEWATIN, NORTHWEST TERRITORIES, CANADA.
Technical rept. no. 15,
by James A. Larsen. Aug 64, 84p
Contract Nonr1202 07, Proj. NR387 022

Unclassified report

Descriptors: (*Ecology, Northwest territories), (*Climatology, Northwest territories), (*Glaciers, Climatology), Biology, History, Geography, Plants (Botany), Ice, Trees, Adaptation (Physiology), Arctic regions, Wisconsin, Canada.

Recognition of broad relationships between climate and the geographical range of plant species is based upon understanding of the ecological principles governing the response of the individual species to environment, in turn the result of physiological adaptations and evolutionary history. During the periods of glaciation, at least the Wisconsin glaciation, the Arctic flora apparently survived principally north of the ice in refugia along the north slope of the Brooks Range and the extreme Western Islands, and the boreal flora survived to the south of the ice. The

Tertiary flora of the Arctic, known from fossil evidence, indicates that at this period a climate milder than at present (and much milder than the subsequent Pleistocene) extended far to the north, permitting forest growth into at least certain parts of the southern half of the Arctic Archipelago. Retreat of the Wisconsin ice permitted both arctic and boreal species to migrate into the areas they occupy today. In these areas there is now a wide variety of evidence indicating that there was a period of rather marked genetic differentiation (during the glaciations) followed by subsequent hybridization and intermingling of species and varieties. This is interpreted to mean that species were often split into two populations by the advancing ice. (Author)

AD-608 152 Div. 2, 12
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE TWINNED SPACE FLIGHTS OF VOSTOK-5 AND VOSTOK-6, PT. II,
by Peter Hedervari. 15 Oct 64, 10p
FTD TT64 672; TT 65 60009

Unclassified report

Edited trans. of Repules (Hungary) 1963, no. 8, p. 14-15. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Space environmental conditions, Measurement), (*Cosmic rays, Upper atmosphere), Charged particles, Terrestrial magnetism, Magnetic fields, Micrometeorology, Meteorites, Density, Dust, Space flight, Spacecraft, Data, Hungary.

A popularized account is given of results of measurements of space environmental conditions by instruments aboard Vostok-5 and Vostok-6. The investigations concerned the concentration of charged particles and the 'soft' component of ionizing radiation in the upper atmosphere; the terrestrial magnetic field; the density of the upper atmosphere; and the effects of micrometeorites and cosmic dust.

AD-608 154 Div. 2, 12, 30
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
INPUT-OUTPUT EXPERIMENT.
Semiannual technical summary rept. for period ending 30 Sep 64,
by R. E. Meyerott. 26 Oct 64, 42p LMSC-8-79-64-1
Contract Nonr3398 00

Unclassified report

Descriptors: (*Aurorae, Scientific research), (*Scientific satellites, Instrumentation), Electron density, Distribution, Optical properties, Measurement, Optical equipment, Radiation measurement systems, Radio equipment, Nuclear explosions, High altitude, Ionization, Charged particles, Simulation, Geophysics.

The objective of the suggested Input-Output experiment was to determine the feasibility of using auroral phenomena to simulate the ionizing effects produced by high-altitude nuclear detonations. Present objectives are focused primarily on the measurement and quantitative correlation of precipitated particles, optical luminosity, and ionization in auroras as well as on the evaluation of the present understanding of particle-atmosphere interaction processes.

AD-608 159 Div. 2, 8, 30
OTS Prices: HC $1.00/MF $0.50

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
THE UNIVERSITY OF ILLINOIS RADIO TELESCOPE.
Progress rept. no. 21, 1 Jul-30 Sep 64,
by G. C. McVittie and G. W. Swenson, Jr. 10 Nov 64, 8p
Contract Nonr1834 22

Unclassified report

Descriptors: (*Telescopes, Astronomical observatories), Astronomical data, Radiometers, Antennas, Galaxies, Recording systems, Analog-to-digital converters, Control systems, Universities, Direction finding.

A 10-foot diameter direction-finding antenna for detecting interference is mounted on top of the radio telescope towers. An 8-level tape punch system has been developed to digitize the analog output of the radiometer of the radio telescope. The system consists basically of a shaft encoder which digitizes the analog output at the recorder, an associated relay circuit which controls the timing of readouts and also supplies functional informations to be punched onto the tape along with the regular data entries, and the tape punch itself. A circuit for automatic gain reduction on the Daystrom recorder was added to the radiometer. The activation of this circuit is controlled by the digital sidereal clock and is programmed so that it is turned on during crossings of the Galaxy. This is done to prevent the recorder going off scale. In this way scans of the Galaxy at the various declinations will be preserved and can be reduced later should contour maps of the Galaxy be required.

AD-608 162 Div. 2, 30
OTS Prices: HC $6.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PRACTICAL METHODS OF NUMERICAL WEATHER PREDICTION,
by P. N. Belov. 25 Sep 64, 278p
FTD MT64 119; TT 65 60010

Unclassified report

Edited machine trans. of mono, Prakticheskie Metody Chislennogo Prognoza Pogody, Leningrad, 1963, 258p.

Descriptors: (*Weather forecasting, Mathematical prediction), Hydrodynamics, Thermodynamics, Equations, Meteorological parameters, Meteorological phenomena, Numerical analysis, Statistical analysis, Programming (Computers), Numerical methods and procedures, Meteorology, USSR.

Contemporary hydrodynamic and statistical methods of numerical weather prediction applied in operational work of the forecastings service and method of numerical (objective) analysis of meteorological data are considered. There are discussed principles of programming for electronic computers and application of these machines in problems of forecasting. For facilitating the reading there are presented certain data from higher mathematics and dynamic meteorology. The book is intended for a wide circle of meteorologists, synoptical and practicing meteorologists of operational subdivisions of forecasting service and for students. (Author)

AD-608 234 Div. 2
OTS Prices: HC $2.00/MF $0.50

Woods Hole Oceanographic Institution, Mass.

NARRATIVE OF CHAIN CRUISE NO. 39, WOODS HOLE TO BERMUDA TO THE ABYSSAL HILLS AND RETURN TO WOODS HOLE, 23 AUGUST-23 SEPTEMBER 1963,
by Elizabeth T. Bunce and David D. Caulfield. Jul 64, 40p WHOI-Ref-64-43
Contract Nonr4029 00

Unclassified report

See also AD-605 775.

Descriptors: (*Oceanology, Atlantic Ocean), (*Atlantic Ocean, Oceanology), Hydrographic sonar, Ocean bottom topography, Marine geophysics, Oceanographic equipment, Calibration, Underwater sound equipment, Thermodynamics, Oceanographic data, Reports.

CHAIN Cruise 39 was made in two parts, the first from Woods Hole to Bermuda, 23 August to 1 September, and the second from Bermuda to the abyssal-hills area to the southeast and back to Woods Hole, 3 September to 23 September, 1963. The continuous observations carried out on this cruise consisted of echo sounding, measurements of the earth's gravity, and seismic reflection profiling. The program also included calibrations of the outputs of the new high-energy sparker and the new Boomer transducers, evaluation of a matched-filter correlator in the seismic detection system, heat flow measurements with the gravity corer, and rock dredge and camera lowerings. A summary account of the first part of the cruise and a journal of the second constitute the text of this report. Lists of some of the stations and their locations are given in an appendix, and two charts summarize the ship's track. (Author)

AD-608 235 Div. 2
OTS Prices: HC $3.00/MF $0.75

Woods Hole Oceanographic Institution, Mass.
NARRATIVE OF CHAIN CRUISE NO. 34, WOODS HOLE TO PUERTO RICO TRANCH, NORTH WALL, AND OUTER RIDGE AND RETURN, 21 OCTOBER-13 DECEMBER, 1962,
by J. B. Hersey and Elizabeth T. Bunce. Jul 64, 72p WHOI-Ref-64-35
Contract Nonr4029 00

Unclassified report

See also AD-608 234.

Descriptors: (*Oceanology, Atlantic Ocean), (*Atlantic Ocean, Oceanology), Marine geophysics, Thermodynamics, Seismology, Ocean bottom topography, Ocean bottom sampling, Oceanographic equipment, Hydrographic surveying, Oceanographic data, Reports.

Two distinct programs were carried out on CHAIN Cruise 34, conducted between southern New England and Puerto Rico. One was a study of the temperature structure of the upper 500 feet of the water column (with thermistor chain and contouring temperature recorder). The other, an intensive geophysical study of the Nares Basin, the Puerto Rico Trench and Outer Ridge, and a small portion of the Bermuda Rise, comprised continuous observations of gravity and total-intensity magnetic fields, seismic profiling, and bathymetry, as well as point observations of bottom reflectivity, seismic velocity, and the correlation of horizontal temperature changes with GEK-measured currents. The journals of the chief scientists form the basis of this report. A tabulation of the sort of observations made and their locations is included together with track charts. (Author)

AD-608 271 Div. 2, 4, 25
OTS Prices: HC $3.00/MF $0.75

General Atomic Div22 General Dynamics Corp., San Diego, Calif.
EXPERIMENTAL STUDIES ON HEAVY ION EXCHANGE IN AIR.
Final rept.
by W. L. Fite and R. F. Stebbings. Oct 64, 57p
Contract AF29 601 6106, Proj. 5710, Task 07 003
WL TDR64 89

Unclassified report

Descriptors: (*Atmosphere, Ion exchange), (*Ion exchange, Atomosphere), (*Aluminum, Ion exchange), Argon, Nitrogen, Oxygen, Air, Electrostatics, Transport properties, Ions, Electron capture, Atomic orbitals, Gas ionization, Ion sources.

Charge-changing collisions between Al+ ions and the gases Ar, N2, O2, and air were examined over the velocity range 0.25 to 1.9 x 10 to 8th power cm/sec. Fast particle detection was used to obtain values for the electron capture cross section sigma-10, and the ion stripping cross sections sigma-12 and sigma-13. Higher ion stripping cross sections and capture cross sections to form negative ions of Al were negligible in comparison. In the lower velocity range (0.25 to 0.8 x 10 to the 8th power cm/sec), measurements of the total apparent ionization cross section of the target gas were made using slow particle detection. Estimates of the neutral Al stripping were made at the higher velocities, and these were found to be almost an order of magnitude higher then sigma-10. Ion sources for Al(+) and other metallic ions are discussed together with general considerations pertaining to experiments using such ions. (Author)

AD-608 300 Div. 2, 16
OTS Prices: HC $4.00/MF $0.75

Agricultural Research Service, Riverside, Calif.
WATER TRANSFER FROM SOIL TO THE ATMOSPHERE AS RELATED TO SOIL PROPERTIES, PLANT CHARACTERISTICS AND WEATHER.
Annual rept. for 1 Jul 63-30 Jun 64,
by W. R. Garner, E. J. Doering, C. F. Ehlig, F. J. Miklich, and L. A. Richards. Jul 64, 102p
Task 1A0 11001B021 08 02
ARS R RR374

Unclassified report

Descriptors: (*Evapotranspiration, Plants (Botany)), (*Plants (Botany), Evapotranspiration), (*Soils, Hydrology), Water, Transport properties, Diffusion, Hygrometers, Meteorological parameters, Thermocuples, Conductivity, Cooling, Salinity, Atmosphere.

Contents: Water flux from soil to plant to atmosphere, by W. R. Gardner and C. F. Ehlig; Movement of soil water, by W. R. Gardner, L. A. Richards, F. J. Miklich and E. J. Doering; Soil-water energy relations, by L. A. Richards; Physical aspects of the internal water relations of plant leaves; Lower limit of water availability to plants; Water movement below the root zone; Soil-water diffusivity by the one-step method; Metallic conduction for cooling a thermocouple psychrometer bath.

AD-608 302 Div. 2
OTS Prices: HC $7.00/MF $1.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CLIMATE OF THE USSR, 1961, NO. 5, EASTERN SIBERIA,
by E. Ya. Shcherbakova. 5 Oct 64, 340p
FTD MT63 338; TT 65 60108

Unclassified report

Vostochnaya Sibir', edited machine trans. of Klimat SSSR, 1961, no. 5, p. 1-300.

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Climatology, Siberia), (*Siberia, Climatology), (*USSR, Climatology), Meteorological parameters, Meteorological phenomena, Solar radiation, Atmospheric temperature, Atmospheric precipitation, Humidity, Permafrost, Cloud cover, Snow, Wind, Rivers, Seas, Lakes.

Characteristics of the chief radiation and circulation factors, general characteristics of climate of Eastern Siberia and a description of its individual elements (temperture, humidity, wind conditions, etc.) are contained in the report. In addition, the role of the underlying surface in creating the climate is pointed out and a climatic description of individual physicogeographic regions is given. The information is intended for scientific workers and specialists in the fields of climatology, geography, and agriculture as well as for school teachers, and students of higher educational institutions.

AD-608 345 Div. 2, 20
OTS Prices: HC $1.00/MF $0.50

Minnesota, Univ., Minneapolis. School of Physics.
EXPERIMENTAL OBSERVATIONS ON THE INTENSITIES OF HELIUM NUCLEI IN THE PRIMARY COSMIC RADIATION.
Technical rept.,
by P. S. Freier, G. D. Greer, J. Valdez, and C. J. Waddington. Oct 64, 16p CR-72
Contract Nonr710 60

Unclassified report

Descriptors: (*Helium, Cosmic rays), (*Cosmic rays, Helium), Charged particles, Nuclei, Nuclear particles, High altitude, Balloons, Radiation measurement systems, Photographic emulsions, Geophysics, Astrophysics, Experimental data.

The results are presented of thirteen separate observations of the characteristics of the helium nuclei in the primary cosmic radiation. These observations were made using photographic nuclear emulsions flown on high altitude balloons to detect the particles during times ranging from the minimum of solar activity to the maximum. Attention is confined to the presentation of the experimental data, with a detailed discussion of the physical significance being deferred to a later paper. The results are compared with those published previously on the higher charged nuclei in the cosmic radiation. (Author)

AD-608 351 Div. 2, 9
OTS Prices: HC $3.00/MF $0.75

Pennsylvania State Univ., University Park. Coll. of Engineering and Architecture.
AIRBORNE INVESTIGATION OF ATMOSPHERIC TURBULENCE.
Master's thesis,
by Fred Ray Payne. Sep 64, 66p

Unclassified report

Descriptors: (*Atmospheric motion, Measurement), Anemometers, Airborne, Wind, Fluid flow, Spectroscopy, Data, Mathematical analysis.

In atmospheric turbulence a (-5/3) power law behavior of the energy spectrum was shown by experiment to exist over a considerable range of wave numbers. This range can exceed three decades under conditions of intense dissipation. Proof was given of the feasibility of airborne hot-wire anemometry as a new experimental technique.

AD-608 352 Div. 2
OTS Prices: HC $1.00/MF $0.50

Lunar and Planetary Lab., Univ. of Arizona, Tucson.
LABORATORY RESEARCH ON GASES OCCURING IN PLANETARY ATMOSPHERES.
Final rept. for 1 Jun 63-31 May 64,
by Gerard P. Kuiper. 31 May 64, 8p
Grant Nonr G00014 64

Unclassified report

Descriptors: (*Planetary atmospheres, Spectroscopy), Mars, Jupiter, Saturn, Uranus, Gases, Absorption spectrum.

Results of studies of the absorption spectra of planetary atmospheres are summarized. The investigations were largely involved with the composition of the Martian and Jovan atmospheres, but limited data were also obtained concerning the atmospheres of Io, Ganymede, Saturn, and Uranus.

AD-608 397 Div. 2, 25
OTS Prices: HC $2.00/MF $0.50

Woods Hole Oceanographic Institution, Mass.
REFLECTION OF SEISMIC WAVES AT OBLIQUE ANGLES FROM DEEP SEA SEDIMENTS.
Master's thesis,
by Peter C. Beamish. Jul 64, 34p WHOI-Ref-64-32
Contract NObsr89464

Unclassified report

Descriptors: (*Hydrographic sonar, Seismic waves), (*Seismic waves, Hydrographic sonar), Underwater sound, Sound transmission, Towed sonar, Hydrophones, Ocean bottom topography, Sedimentation, Acoustic properties, Mediterranean Sea, Atlantic Ocean, Marine geophysics, Oceanology.

The theory of oblique-angle seismic reflectivity, as applied to oceanographic research, is presented. An experiment has been developed in which continuous oblique reflection profiles were made by towing an acoustic source behind a ship and listening with a hydrophone suspended beneath a free-floating radio buoy. Information received at the hydrophone was transmitted to the ship and recorded on magnetic tape. Energies of the bottom-reflected signals have been calculated for varying angles of incidence and the corresponding reflectivities produced. Results from the Tyrrhenian Sea and from north of Puerto Rico indicate the possibility that the sound velocity in the first-layer sediments is less than the sound velocity of the bottom water. (Author)

AD-608 408 Div. 2, 13, 25, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A FEW ROCK MECHANICS PROBLEMS IN CORRELATING LABORATORY RESULTS WITH PROTOTYPE REACTIONS,
by Wm. R. Judd. Oct 63, 38p P-2806

Unclassified report

Paper presented at Annual Colloquium of the International Bureau of Rock Mechanics (5th), Leipzig, German Democratic Republic, 5-9 Nov 63.

Descriptors: (*Structural geology, Test methods), (*Rock (Geology), Mechanics), (*Underground structures, Design), Mining engineering, Experimental data, Test equipment, Photoelasticity, Instrumentation, Gases, Storage, Loading (Mechanics).

Consideration of the application of laboratory test results

in prediction of the reaction of a rock massif led to the conclusion that physical properties of rock should be measured to provide data on rock necessary for engineering design. One approach for such correlation was a field test on a small-scale model of a prototype for the proposed underground storage of gas. Laboratory tests of the dacite porphyry indicated too broad a range of data to provide a safe factor for prototype design so that determination of rock modulus by field test appeared desirable. Maximum 400-psi pressure was not achieved in the steel-linetest chamber since the steel lining ruptured at 2650 psi. Conclusions of the project are that geological defects in rock massif are a prime consideration in determining the deformation modulus of rock. A reasonable safety factor for design purposes would require a design modulus about one-tenth of the laboratory modulus. Also, when grouting must be used to produce a monolithic rock mass, with resultant improvement in elastic modulus of the massif, there must be enough coring and seismic testing to determine whether there is effective grout penetration.

AD-608 409 Div. 2, 6
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPLETE SCATTERING PARAMETERS OF POLYDISPERSED HYDROMETEORS IN THE 0.1 TO 10 cm RANGE,
by D. Deirmendjian. Nov 64, 24p P-2914-1
Unclassified report

Descriptors: (*Clouds, Radar reflections), (*Microwaves, Scattering), (*Raindrops, Particle size), Atmospheric precipitation, Meteorological parameters, Polarization, Absorption, Mathematical models, Albedo (Astronomy), Functions, Radar echo areas.

The extinction, the albedo of single scattering, the differential scattering cross section, and the complete polarization properties, per unit volume of cloud and rain elements, irradiated by microwave radiation at various frequencies were determined. Continuous drop-size distribution functions are introduced to represent real clouds and precipitation, and the absorption and scattering parameters are integrated with high accuracy. A Rayleigh approximation is found adequate for the cloud model, but the complete Mie expressions had to be used for precipitation-sized particles. Older estimates were corroborated, but some new features were brought out for the first time, such as the scattering intensity and polarization (including its ellipticity) as a function of scattering angle. (Author)

AD-608 440 Div. 2, 30
OTS Prices: HC $2.00/MF $0.50

Microwave Lab., Stanford Univ., Calif.
THE RESONANCE PROBE - A TOOL FOR IONOSPHERIC AND SPACE RESEARCH,
by F. W. Crawford and R. S. Harp. Oct 64, 29p
Contract AF33 616 8121, Proj. 7073, Task 7073 03
ARL 64 137
Unclassified report

Descriptors: (*Resonance, Probes (Electromagnetic)), (*Probes (Electromagnetic), Resonance), (*Measuring devices (Electrical and Electronic), Probes (Electromagnetic)), Radiofrequency, Electrical impedance, Plasma sheath, Electron density, Atmospheric sounding, Space probes, Plasma physics.

Previous experiments on the rf impedance between two probes immersed in a plasma, and on the incremental dc characteristics of an rf modulated probe, have suggested that resonance effects occur at the local electron plasma frequency, omega sub p, and can be interpreted to obtain a direct measurement of electron density, free from many of the errors to which conventional Langmuir probe techniques are prone. A simplified model which gives predictions agreeing well with experiment is presented. This model is developed and applied to several different probe geometries of interest in ionospheric and space studies. Additional rf techniques are suggested which may prove superior to incremental dc observations for measurement and data coding for transmission to terrestrial stations. An assessment is made of the various regions of applicability of the resonance probe in space, and it is concluded that a detailed theory of the effects of magnetic field on the resonance is required to increase its usefulness for ionospheric probing.

AD-608 442 Div. 2
OTS Prices: HC $5.00/MF $1.25

Technische Hochschule, Darmstadt (West Germany).
RESEARCH IN ATMOSPHERIC MACROTURBULENCE. Final rept.
by F. Wippermann. 30 Jun 64, 194p
Contract AF61 052 366
AFCRL 64 867
Unclassified report

Descriptors: (*Atmospheric motion, Scientific research), (*Scientific research, Atmospheric motion), Atmosphere, Turbulence, Meteorological phenomena, Diffusion, Wind, Air mass analysis, Deformation, Fluid mechanics, Energy, Fourier analysis, Series, Differential equations, Stochastic processes, Transport properties, Particles, Trajectories.

Contents: On the EULERean and LAGRANGEan statistics of very large-scale atmospheric motions; Some problems of atmospheric diffusion on very large-scale; The effect of deformation in the wind field on the large-scale horizontal dispersion of clusters in the atmosphere; On the two dimensional spectral analysis of kinetic energy over a circumpolar area of a sphere; About the differential equations of particle diffusion in the atmosphere caused by large-scale turbulence; Remarks on the behavior of computed air trajectories near the boundaries of an octagonal area.

AD-608 464 Div. 2, 31
OTS Prices: HC $1.00/MF $0.50

Measurement Analysis Corp., Los Angeles, Calif.
SPECTRA AND AUTOCORRELATION FUNCTIONS FOR FULLY DEVELOPED SEAS AND PREDICTION OF STRUCTURAL FATIGUE DAMAGE,
by Julius S. Bendat. Sep 64, 31p MAC-307-04
Contract Nonr4305 00, Proj. S R009 01 01
Unclassified report

Descriptors: (*Ocean waves, Wind), (*Damage, Ocean waves), Stochastic processes, Integral transforms, Statistical functions, Ship structural components, Fatigue (Mechanics), Mathematical prediction.

This report analyzes the Pierson-Moskowitz spectrum for fully developed seas and obtains further properties about its structure. Results are obtained for two distinct applications: (1) determination of corresponding auto-correlation function, and (2) prediction of possible associated structural fatigue damage for single degree-of-freedom systems. (Author)

AD-608 466 Div. 2, 30
OTS Prices: HC $2.00/MF $0.50

Illinois Univ., Urbana.
A SPECIALIZED TYPE OF SEISMIC RESEARCH.
Final rept. for 1 Sep 62-1 Dec 64,
by A. E. Scheidegger. 1 Dec 64, 40p
Grant AF AFOSR62 419, ARPA Order 292 62
Unclassified report

Descriptors: (*Seismology, Scientific research), Stresses, Seismic waves, Shock (Mechanics), Theory, Faults (Geology), Earthquakes, Explosions, Identification, Statistical analysis, Integral equations, Mechanical waves.

The aim of the research project was to investigate the relation of the mechanisms of natural seismic foci to the prevailing tectonic stress field in an area. After the determination of this relation, a criterion for distinguishing natural seismic shocks from explosions was to be established. The stages of the investigations were the following: (1) The possible theoretical relationships between focal mechanisms and tectonic stresses were analyzed (2) The data of focal mechanisms ('fault plane solutions') available in the literature were collected and tabulated in a uniform fashion (3) The best statistical means for averaging the various parameters of fault plane solutions of earthquakes were developed (4) The statistical connection between focal mechanisms and the tectonic stress field was established (5) A criterion for distinguishing seismic from artificial shocks was proposed.

AD-608 474 Div. 2
OTS Prices: HC $3.00/MF $0.50

Ionospharen-Institut, Breisach (West Germany).
LARGE SCALE FLUCTUATIONS OF THE IONOSPHERE.
Technical rept.,
by K. Bibl. 15 Jul 64, 56p IIB-12
Contract AF61 052 623
AFCRL 64 900 Unclassified report

Descriptors: (*Ionosphere, Electron density), (*Electron density, Ionosphere), Electrons, Distribution, Atmosphere, Oscillation, Ionization, Statistical analysis, Test facilities, Europe, Geophysics, Experimental data, Graphics.

By statistics based on ionogram data of three European stations amplitudes and quasi-periods of the fluctuations and their directions are determined. Different periods of the day, seasons and in-or de-creasing changes are treated separately. The oscillations found tend to produce higher electron density during downwards movement. (Author)

AD-608 477 Div. 2
OTS Prices: HC $2.00/MF $0.50

Kiruna Geophysical Observatory (Sweden).
THE POLARIZATION OF GIANT PULSATIONS AT KIRUNA.
Scientific rept. no. 1,
by K. V. Paulson, A. Egeland, and F. Eleman.
25 Jul 64, 38p
Contract AF61 052 619
AFCRL 64 866
Unclassified report

Prepared in cooperation with Swedish Board of Shipping and Navigation, Stockholm.

Descriptors: (*Terrestrial magnetism, Oscillation), (*Geophysics, Terrestrial magnetism), Polarization, Frequency, Matrix algebra, Statistical functions, Magnetic fields, Sweden, Vector analysis.

The polarizations of four of the five giant pulsations recorded during 1963 at Kiruna (phi = 67.8 degrees N., lambda = 20.4 degrees E.) have been analyzed by a method which has not been used in previous geomagnetic investigations. This method of analysis is developed in some detail and gives a quantitative measure of the type and degree of polarization and the principal directions of the resultant vectors is each of three orthogonal planes. In addition, the phase differences between each of the three orthogonal components and the mean or dominant period of the quasi-periodictime variation in each component have been derived from calculated crosscorrelation and autocorrelation functions. For these giant pulsations, attention is drawn to the variance of the vertical component which is of the same order and often larger than the variance of the corresponding north component. Hence, any physical explanation is inadequate if it is based solely on the field-line propagation of transverse hydromagnetic waves. (Author)

3. Chemical Warfare Equipment and Materials

AD-608 182 Div. 3, 18, 20, 29
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SENIOR SERGEANT, 1964, NO. 3-6: SELECTED ARTICLES,
by G. Krylov, P. Ivanov, A. Poklonov, and I. Kantyrev. 6 Oct 64, 29p
FTD TT64 901; 65 60006

Unclassified report

Unedited rough draft trans. of Starshina-Serzhant (USSR) 1964, no. 3 42 p. 10-11; no. 4 43 p. 32-33; no. 5 44 p. 30-31; no. 6 45 p. 28-29.

Descriptors: (*Chemical warfare, Countermeasures), (*Biological warfare, Countermeasures), (*Radioactive fallout, Counter measures), Poisonous gases, Protective masks, Shelters, Radiation monitors, Decontamination, Degasification, Germicides, Military personnel, USSR, Protective clothing.

These articles are devoted to the problems of protection against poisonous and chemical weapons. Collective means of protection, radiation and chemical reconnaissance, and work in the destruction of means of poison attacks are also discussed.

AD-608 200 Div. 3
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Baltimore, Md.
WATER INTAKE AND RESUSCITATION EQUIPMENT FOR PROTECTIVE MASKS.
Quarterly progress rept. no. 2, 1 Jul-30 Sep 64,
by E. D. Legg. 15 Oct 64, 6p
Contract DA18 035AMC123A

Unclassified report

Descriptors: (*Protective mask facepieces, Thirst), (*Artificial respiration, Protective mask facepieces), Army personnel, Casualties, Chemical contamination, Biological contamination, Water, Design, Tests.

This report discusses the development and production of drinking equipment and resuscitation capability for soldiers who are wearing service protective masks while giving aid to battlefield casualties (in a chemical biological contaminated atmosphere). A new developmental model has been produced, and three units developed previously have been tested for leakage. Dioctyl phthalate (DOP) smoke was used to determine leakage. There was good correlation between the results of the DOP smoke test and the electronegative gas detector-freon gas test described in a previous report.

4. Chemistry

AD-608 008 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
MATERIALS AND STRUCTURES. INORGANIC CHEMISTRY PROGRAM.
Semiannual technical rept. for 1 Jul-31 Dec 61,
by W. S. Ginell and J.I. Slaughter. 28 Feb 62, 13p
TDR-930(2240-55)TR-1
Contract AF04 647 930
DCAS TDR62 54

Unclassified report

Descriptors: (*Materials, Snythesis (Chemistry)), (*Inorganic compounds, Scientific research), Chemical reactions, Single crystals, Crystal growth, High-pressure research, Laboratory equipment, Structures.

Progress in the Inorganic Chemistry Program phase of Materials and Structures for 1 July through 31 December 1961 is described. The importance of inorganic chemistry, the acquisition and installation of equipment, the effects of high pressure on chemical reactions, the use of high pressure techniques for preparing new inorganic materials, and the growth and analysis of single crystals are discussed. Future technical plans are also set forth. (Author)

AD-608 042 Div. 4, 27
OTS Prices: HC $3.00/MF $0.75

United Nuclear Corp., White Plains, N. Y.
ELECTROLYTIC REMOVAL OF OXYGEN FROM SODIUM.
Rept. for 8 Aug 63-Jun 30 64,
by J. M. McKee. Aug 64, 80p UNC-5087
Contract AF33 615 1039, Proj. 8169, Task 816902
APL TDR64 93

Unclassified report

Descriptors: (*Oxygen, Separation), (*Oxides, Electrolytes), (*Electrolytic cells, Design), Sodium, Ionization, Reaction kinetics, Electrical conductance, Ceramic materials, Electrodes, Solutions, Films, Pressure, Electrochemistry, Liquid metals, Space propulsion.

Dissolved oxygen was extracted from flowing sodium by ionic transport through an impervious solid electrolyte wall. Current efficiency and cell resistivity were measured for three solid oxide electrolytes at several temperatures and voltages. Best results were obtained with ZrO2 + 8 m/o CaO at 1200F and 4 to 6 volts/mm. Current efficiency was low, due to induced electronic conduction, but oxygen removal rates higher than in zirconium hot traps were achieved. Similar cells tested in pure oxygen at the same temperature also developed electronic conduction, suggesting that it is due more to low temperature electrolysis than to the low oxygen pressure in sodium. Application of such cells to aerospace sodium systems is hindered by the unpredictable life of the ceramic tube. A modified cell concept, substituting an oxide film on a metallic substrate for the free-standing ceramic tube, is described. (Author)

AD-608 051 Div. 4, 8, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

NEW IRON-CONTAINING POLYMERS ON THE BASIS OF FERROCENE AND THEIR ELECTROPHYSICAL PROPERTIES,
by Ya. M. Paushkin, L. S. Polak, T. P. Vishnyakova, I. I. Patalakh, and F. F. Machus. 19 Oct 64, 14p
FTD TT64 773; TT 64 71689

Unclassified report

Unedited rough draft trans. of Vysokomolekulyarnye Soedineniya (USSR) 1964, v. 6, no. 3, p. 545-550.

Descriptors: (*Semiconductors, Ferrocenes), (*Ferrocenes, Synthesis (Chemistry)), (*Inorganic polymers, Ferrocenes), Iron compounds, Polymerization, Complex compounds, Physical properties, Electrical properties, Resistance (Electrical), Heat of activation, Surface properties, Adsorption, Atomic orbitals, USSR.

There were obtained, by means of polyrecombination and condensation polymerization, 14 new polymers based on ferrocene and its derivatives, and their properties were studied. 2. It is shown that the polymers obtained which represent polyconjugate systems possess polyconductor properties. Their specific electrical resistances lie in the interval from 1 x 10 to the 12th power 1 x 10 to the 9th power cm/ohm and the energy of activation in the interval from 0.3 to 1.74 ev (without desorption from the surface). 3. An explanation is given of the role and the effect of the surface adsorption on the semiconductor properties of the polymer of 1, 1'-diacetyl-ferrocene. It is shown that the greater energies observed for the activation are brought about to some degree by the excitation of p1-electrons from the valence zone into the zone of conductivity of the macromolecules and basically by the surface adsorption. (Author)

AD-608 052 Div. 4, 10, 22
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONCERNING THE PROBLEM OF THE DECOMPOSITION MECHANISM OF AMMONIUM PERCHLORATE,
by A. V. Raevskii and G. B. Manelis. 6 Oct 64, 10p
FTD TT64 768; TT 64 71688

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 151, no. 4, p. 886-889.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ammonium compounds, Perchlorates), (*Perchlorates, Decomposition), Explosive materials, Propellants, Single crystals, Nucleation, Pyrolysis, Reaction kinetics, Photographic analysis, USSR.

Bircumshaw established, in the course of microscopic observations of partially decomposing crystals, that the process of decomposition develops at discrete nuclei. An accurate numerical study of the kinetics of the formation, size, and development of the nuclei appears to be of significant interest for the purpose of determining the reaction mechanism in the single crystals of ammonium perchlorate. In connection with this, microcinematography of the decomposition process was conducted on the single crystals of ammonium perchlorate. In addition to the microscopic observations, kinetic curves of the thermal decomposition were plotted for the single crystals, NH4ClO4 'in air', relative to weight loss.

AD-608 074 Div. 4, 17
OTS Prices: HC $1.00/MF $0.50

Air Force Materials Lab., Air Force Systems

Command, Wright-Patterson AFB, Ohio.
DETERMINATION OF TRACE AMOUNTS OF MOLYBDENUM AND NIOBIUM IN TUNGSTEN USING A SMALL ANION EXCHANGE COLUMN.
Rept. for Jan 63-Jun 64,
by Ken F. Sugawara. Sep 64, 16p
Proj. 7360, Task 736005
ML TDR64 268

Unclassified report

Descriptors: (*Tungsten, Chemical analysis), (*Molybdenum, Ion exchange), (*Niobium, Ion exchange), Refractory metals, Impurities, Absorption spectrum, Ion exchange resins.

A procedure is reported for the determination of trace amounts of molybdenum and niobium in tungsten using a comparatively small column. Tungsten, the matrix material, passes through the column while the impurities, molybdenum and niobium are adsorbed by the anion exchange resin. Molybdenum and niobium are then selectively eluted from the resin column and determined spectrophotometrically. (Author)

AD-608 166 Div. 4
OTS Prices: HC $1.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
FLUORIDES AND OXYFLUORIDES OF CHLORINE: REVIEW ARTICLE.
10 Nov 64, 11p
ATD P64 61; TT 65 60000

Unclassified report

Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Oxidizers, Reviews), (*Fluorides, Perchloryl radicals), Oxyfluorides, Chemical properties, Chlorine compounds, Fuels.

An attempt is made to answer the following questions: (1) What is the real name for the 'new compound - perftorkhlorid' mentioned in the article and why is it named 'perftorkhlorid.' and (2) Are there any indications in the Soviet literature for higher fluorides of chlorine than trifluoride (ClF3). An analyst's comment is provided, and a list of references arranged in alphabetical order by author is included at the end of the report.

AD-608 201 Div. 4
OTS Prices: HC $2.00/MF $0.50

Pennsalt Chemicals Corp., Philadelphia, Pa.
PHOSPHINYLMETHYLPHOSPHINATES AS CHELATING LIGANDS.
Technical rept. no. 43,
by J. P. King, B. P. Block, and I. C. Popoff.
Nov 64, 29p
Contract Nonr2687 00, Proj. NR356 408

Unclassified report

Descriptors: (*Organic phosphorus compounds, Synthesis (Chemistry)), (*Complex compounds, Synthesis (Chemistry)), Phosphinic oxides, Hydrolysis, Zinc compounds, Chromium compounds, Metalorganic compounds, Stabilization, Gravimetric analysis, Spectra (Infrared), Nuclear magnetic resonance, Absorption spectrum, Molecular weight, Chemical bonds, Thermal properties.

(Dimethylphosphinyl)-,(methylphenylphosphinyl)-, and (diphenylphosphinyl)-methylphenylphosphinic acids were prepared by hydrolysis of the Michaelis-Arbuzov reaction products of the appropriate chloromethyl-phosphine oxides and diethyl phenylphosphonite. They react with $Zn(C_2H_3O_2)_2.2H_2O$ and $Cr(C_5H_7O_2)_3$ under suitable conditions to yield the corresponding bis and tris chelates, except for the diphenyl-chromium (III) derivative which was prepared in low yield via the chromium(II) derivative. The zinc derivatives are dimers, the chromium derivatives monomers. The metal chelates are more thermally stable than the corresponding acetylacetonates. Their infrared and ^1H NMR spectra are discussed. (Author)

AD-608 222 Div. 4, 10
OTS Prices: HC $2.00/MF $0.50

TRACOR, Inc., Austin, Tex.
ELECTROCHEMICAL STUDIES IN THE SYNTHESIS OF N-F COMPOUNDS.
Quarterly status rept. no. 6, 1 Apr-30 Jun 64,
by Larry G. Spears, Larry D. Fiel, Wallace E. Harrell, Jr., and Gerhard M. Schmid. 11 Nov 64, 30p
TRACOR 64-304-U
Contract Nonr4054 00, Projs. RR001 06 02, ARPA Order 399

Unclassified report

See also AD-405 903.

Descriptors: (*Oxidizers, Synthesis (Chemistry)), (*Ammonium compounds, Fluorides), (*Fluorides, Electrochemistry), Hydrogen compounds, Polarization, Electrolysis, Electrical conductance, Contamination, Electrodes, Pyrolytic graphite, Stability, Degradation, Fluorination.

The work was devoted primarily to studying the anodic polarization of Monel in anhydrous hydrogen fluoride (AHF) and to the electrolysis of ammonium fluoride (NH_4F) in AHF using Monel as the working electrode. Conductance studies were also performed to determine the rate of contamination of the AHF as it was held in the sealed cells. Determinations of the effects of electrolysis and additions of water and NH_4F on the conductivity of HF were also made. Pyrolytic carbon was investigated as a possible electrode material. The carbon was mounted in Kel-F to expose only a single crystal plane, and, although it resisted attack by AHF, it disintegrated when fluorine was evolved anodically. Results to date indicate that fluorination during the electrolysis of NH_4F in AHF proceeds by chemical rather than by an electrochemical mechanism. (Author)

AD-608 243 Div. 4, 25
OTS Prices: HC $2.00/MF $0.50

Gates and Crellin Labs of Chemistry, Calif. Inst. of Tech., Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. STUDIES OF 1, 1, 4, 4-TETRAFLUORO-1, 3-ALKADIENES.
Technical rept. no. 34,
by Kenneth L. Servis and John D. Roberts. Sep 64, 34p
Contract Nonr220 26, Proj. NR055 388

Unclassified report

Prepared for publication in Journal of the American Chemical Society.

Descriptors: (*Nuclear magnetic resonance, Halogenated hydrocarbons), (*Halogenated hydrocarbons, Nuclear magnetic resonance), (*Fluorine compounds, Nuclear magnetic resonance), Dipole moments, Molecular isomerism, Nuclear spins, Chemical bonds, Atomic orbitals, Cyclobutanes, Cyclohexenes, Spectroscopy.

1, 1, 4, 4-Tetrafluoro-1, 3-butadiene is indicated by dipole-moment studies to exist in the s-trans conformation. The F19-F19 spin-spin couplings constants for this compound are surprisingly similar to those of bis-4, 5-(difluoromethylene)-cyclohexene and perfluoro-1, 2-dimethylenecyclobutane both of which substances have their double bonds held in s-cis configurations. The results are related to the mechanism of transmission of fluorine-fluorine spin-spin interactions and are inconsistent with a predominance of a 'through-space' mechansism of coupling. (Author)

AD-608 244 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
NITROGEN-15 MAGNETIC RESONANCE SPECTROSCOPY III.
Technical rept. no. 35,
by Joseph B. Lambert, Bryan W. Roberts, Gerhard Binsch, and John D. Roberts. Sep 64, 16p
Contract Nonr220 26; Grant PHS11072 01, Proj. NR055 388
Unclassified report

Prepared for publication in Symposium 'N.M.R. in Chemistry: The Fifteenth Year' Societa' Italiana per il Progresso delle Scienze. See also AD-605 675.

Descriptors: (*Nuclear magnetic resonance, Nitrogen), (*Nitrogen, Nuclear magnetic resonance), Isotopes, Labeled substances, Spectroscopy, Organic nitrogen compounds, Molecular structure, Reviews.

Certain studies utilizing N15-MR techniques are reviewed and areas for future investigations are suggested.

AD-608 245 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. TEMPERATURE DEPENDENCE OF THE SPECTRUM OF FLUOROCYCLOOCTATERAENE.
Technical rept. no. 36,
by Donald E. Gwynn, George M. Whitesides, and John D. Roberts. Nov 64, 13p
Contract Nonr220 26, Proj. NR055 388
Unclassified report

Prepared for publication in the Journal of the American Chemical Society.

Descriptors: (*Nuclear magnetic resonance, Halogenated hydrocarbons), (*Halogenated hydrocarbons, Nuclear magnetic resonance), (*Fluorine compounds, Nuclear magnetic resonance), Cyclooctatetraene, Spectroscopy, Chemical bonds, Molecular isomerism, Atomic orbitals, Nuclear spins.

The fluorine n.m.r. spectrum of fluorocyclooctatetraene has been shown to be temperature dependent between 30C and -65C. This is attributed to changes in the rate of an inversion-bond shift process which is slow on the n.m.r. time scale at low temperatures. The free energy of activation for inversion is approximately 12 kcal/mole at -33C. (Author)

AD-608 263 Div. 4, 14
OTS Prices: HC $3.00/MF $0.75

General Precision, Inc., Little Falls, N. J.
HIGH-TEMPERATURE RESISTANT POLYMERS.
Final rept. for 1 Jan-31 Oct 64,
by J. Luloff and C. Vogel. 15 Nov 64, 69p
Contract NObs90194, Proj. SR007 04 01, Task 1050
Unclassified report

Descriptors: (*Heat-resistant plastics, Synthesis (Chemistry)), (*Phthalocyanines, Synthesis (Chemistry)), (*Organoboranes, Synthesis (Chemistry)), Silicon compounds, Titanium compounds, Aluminum compounds, Metalorganic compounds, Complex compounds, Chlorides, Hydrolysis, Polymerization, Spectra (Infrared), Stability, Catalysts.

Studies were pursued in the aluminum, silicon and titanium phthalocyanine systems. Chloraluminum phthalocyanine was prepared and treated with a number of different basic reagents. New reactions were observed with the Grignard reagent and with the strong tertiary amine base, Dabco. Various methods for the improved synthesis of dichlorosilicon phthalocyanine were investigated. Enhanced yields and rates were noted in sealed-tube reactions of silicon tetrachloride, phthalonitrile and quinoline. PcSi(OH)2 was prepared by sulfuric acid hydrolysis of PcSiCl2. Reactions with various carbinols were examined briefly and a prepolymer intermediate condensation product was obtained with resorcinol. An investigation of the titanium phthalocyanine system apparently resulted in the isolation and characterization of the novel +2 valence compound, PcTi, from the reaction of titanium tetrachloride with phthalonitrile. The synthesis of difunctional carborane and neocarboranes was pursued in order to provide comonomers for phthalocyanine copolymers. 6,9-bis (acetonitrilo)decaborane was prepared and converted sequentially to 1,2-bis(acetoxymethyl)carborane and 1,2-bis(hydroxymethyl)carborane. Carborane was synthesized by the basic permanganate oxidation of the carborane diol.

AD-608 337 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Wayne State Univ., Detroit, Mich.
REMARKS ON REFRACTIVE INDEX MIXTURE RULES.
Technical rept. no. 11 (57),
by Wilfried Heller. 28 Jul 64, 23p
Contract Nonr3511 00, Proj. NR051 380
Unclassified report

Submitted to the Journal of Physical Chemistry.

Descriptors: (*Refractive index, Equations), (*Solutions, Refractive index), Mextures, Solvents, Volume, Optical properties, Electromagnetic fields.

The most important refractive index mixture rules used for determining the refractive index of a solute are scrutinized regarding their relative merits and interrelations. The Dale-Gladstone and the Biot-Arago equation are found to follow from either the Lorentz-Lorenz equation or the Wiener equation if the solution is dilute and if, in addition, the refractive indices of solute and solvent are nearly the same. A mixture rule proposed by the writer represents the limiting form of the Wiener equation in case of dilute solutions without restriction as to the value of the refractive indices. The performance of all equations is tested on literature data. The results are in line with expectation on the basis of theoretical analysis. The special case of solutes of colloidal dimensions, where none of the equations applies satisfactorily, is briefly discussed. (Author)

AD-608 411 Div. 4, 12, 16
OTS Prices: HC $2.00/MF $0.50

Air Force Flight Dynamics Lab., Research and

Technology Div., Wright-Patterson AFB, Ohio.
INVESTIGATION OF CATALYTIC REACTIONS FOR CO2 REDUCTION. PART I. EVALUATION OF A NICKEL-KIESELGUHR CATALYST.
Rept. for Jun-Oct 63,
by Edward B. Thompson, Jr. Oct 64, 46p
Proj. 6146, Task 614603
FDL TDR64 22 P1

Unclassified report

Descriptors: (*Life support, Carbon dioxide), (*Carbon dioxide, Reduction (Chemistry)), (*Catalysts, Effectiveness), Nickel, Catalysis, Methane, Water, Hydrogenation, Sulfur, Density, Surface area, Particle size, Chemical equilibrium.

A nickel-kieselguhr methanation catalyst was selected as the initial catalyst of this program for promoting the catalytic reduction of carbon dioxide by hydrogen to methane and water. A catalytic reactor was designed, fabricated, and evaluated utilizing the nickel-kieselguhr methanation catalyst. The reactor processed 2.2 pounds of CO2 per day, equivalent to a one-man daily output. The minimum temperature required to achieve the maximum CO2 conversion rate of 98% for this catalyst was determined to be 575F at a pressure of 1 atmosphere. The total weight of hydrogen required to reduce the 2.20 pounds of CO2 under these conditions is 0.397 pounds. The same batch of catalyst, weighing 300 grams, was used during this entire phase of the experimental program. The catalyst was periodically examined for possible carbon deposition and physical deterioration. While neither of these effects was perceptible, it eventually became necessary to purge the catalyst with hydrogen before each experiment to offset the increasing effect of sulfur poisoning. The report includes a discussion of theory of catalysis and is concluded by recommendations for altering the reactor design and selecting other catalysts for the future phases of this program. (Author)

AD-608 437 Div. 4
OTS Prices: HC $1.00/MF $0.50

Little (Arthur D.), Inc., Cambridge, Mass.
SYMMETRY OF THE HYDRATION ATMOSPHERES OF IONS AND THE TEMPERATURE-DEPENDENCE OF THE VISCOSITY B-COEFFICIENT.
Technical rept. no. 5,
by R. A. Horne. 30 Nov 64, 7p

Contract Nonr4424 00, Proj. NR051 460

Unclassified report

Prepared for submission as a Note in the Journal of Chemical Physics.

Descriptors: (*Solutions, Viscosity), (*Salts, Solutions), Hydrates, Temperature, Electrical conductance, Ions, Water, Molecular properties.

The temperature dependence of the viscosity B-coefficient of ions in aqueous solution is interpretated in terms of the symmetry of the ionic first hydration sheath.

AD-608 467 Div. 4, 25, 30
OTS Prices: HC $2.00/MF $0.50

Rocket Research Lab., Ohio State Univ., Columbus.
SHOCK TUBE DECOMPOSITION OF NITROUS OXIDE.
Interim rept.,
by E. Stokes Fishburne, Daniel M. Bergbauer, and Rudolph Edse. Oct 64, 38p
Contract AF33 657 8951, Proj. 7065, Task 7065 01
ARL 64 143

Unclassified report

Descriptors: (*Nitrogen compounds, Oxides), (*Oxides, Pyrolysis), Shock tubes, Gases, Decomposition, Shock waves, Additives, Argon, Air, Oxygen, Chemical reactions, Reaction kinetics, Thermochemistry, Heat of activation, Hypersonic wind tunnels.

The thermal decomposition of nitrous oxide was studied in the temperature region from 1500K to 2200K. Shock tube techniques, employing the region behind the initial shock wave, were used. Because of the exothermic nature of the decomposition of nitrous oxide it was necessary to study mixtures of nitrous oxide in an excess of diluent. The results obtained with nitric oxide as a diluent indicate that the reaction is bimolecular. The rate constant derived from these experiments is in excellent agreement with the rate constant obtained by other investigators at lower temperatures. The data obtained with argon, oxygen, or air as diluents indicate that the decomposition is bimolecular at low concentrations and becomes monomolecular at higher concentrations. The activation energy was found to depend on concentration. The maximum activation energy occurs at the highest total concentration, about 0.00015 moles/cc, and was determined to be 56,000 cal/mole. (Author)

5. Communications

AD-608 119 Div. 5, 25
OTS Prices: HC $5.00/MF $1.00

Communication Sciences Lab., Univ. of Michigan, Ann Arbor.
FERROELECTRIC TAPE RECORDING AND REPRODUCING PROCESSES.
Technical rept.,
by Tiong Suy Yu. Jun 64, 176p CSL-11
Contract Nonr1224 22, Proj. NR049 122
Unclassified report

Descriptors: (*Ferroelectric materials, Recording systems), (*Recording systems, Ferroelectric materials), Barium compounds, Titanates, Coatings, Plastics, Tapes, Speech, Signals, Reproduction, Data storage systems, Electricity, Magnetism, Feasibility studies.

The development in recent years of ferroelectric materials suggests the possibility of a new method of tape recording. It is the purpose of the study to investigate this possibility. After a theoretical discussion of ferroelectricity, and of tape recording in general, the results of several experiments are presented. The most successful of these employs longitudinal recording on a plastic tape, coated with ferroelectric material. True ferroelectric signal recording is demonstrated, although it is limited in frequency at the high end and in the duration of the record. Recording at the low frequency end is easily achieved. Smaller recording and reproducing gap widths would make it possible to extend the high frequency range considerably. In one experiment a decay to 1/3 of the original amplitude occurred in 150 seconds, at a relative humidity of 20%. Possible methods of removing the high-frequency and decay limitations are discussed. A comparison with magnetic recording is also given. The most apparent advantages of ferroelectric recording are the ease of reaching very low frequencies, and the possibility of less tape wear through the use of out-of-contact reproducing heads. (Author)

AD-608 141 Div. 5, 8, 12, 25
OTS Prices: HC $5.00/MF $1.00

Sylvania Electric Products, Inc., Buffalo, N. Y.
PSEUDO PASSIVE SATELLITE TECHNIQUE STUDY.
Final rept.
Oct 64, 158p
Contract AF30 602 2957, Proj. 4519, Task 451901
RADC TDR64 157
Unclassified report

Descriptors: (*Communication satellites (Passive), Microwave amplifiers), (*Microwave amplifiers, Tunnel diodes), (*Tunnel diodes, Microwave amplifiers), (*Antennas, Communication satellites (Passive), Antenna configurations, Antenna components, Diodes (Semiconductor), Microwaves, Negative resistance circuits, X band, Antenna radiation patterns, Performance (Engineering), (*Experimental data, Feasibility studies.

The Pseudo Passive Satellite Technique uses antenna elements with incorporated tunnel diode amplifiers placed on a surface to increase the scattering cross section of the surface. The study results give stability criteria for the coupled tunnel diode amplifiers, scattering patterns of arrays of antenna elements and criteria to eliminate lobing in the pattern, and tunnel diode amplifier and element design criteria. Experimental results of tunnel diode reliability and parameter variations with temperature are given. An array of X-band integrated antenna elements and tunnel diode amplifiers was tested. Based on the results of the above investigations, the Pseudo Passive Satellite Technique is feasible. (Author)

AD-608 259 Div. 5, 7, 8
OTS Prices: HC $3.00/MF $0.75

Aerospace Technology Div., Library of Congress, Washington, D. C.
COMMUNICATIONS NETWORKS. PART I. REVIEW OF SOVIET LITERATURE: COMPILATION OF ABSTRACTS,
Rept. no. 4
6 Nov 64, 62p
ATD P64 59; TT 65 60013
Unclassified report

Report on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Abstracting, Communication equipment), (*Communication equipment, USSR), (*Communication systems, USSR), Reviews, Bibliographies, Networks.

The topics covered in this report are as follows: (1) Communications equipment (2) Communications facilities and their location.

AD-608 422 Div. 5, 9
OTS Prices: HC $5.00/MF $1.00

Army Electronics Labs., Fort Monmouth, N. J.
USAEL INTERNAL DEVELOPMENT OF RADIO RECEIVER AN/PRR-9 AND RADIO TRANSMITTER AN/PRT-4.
Technical rept.
by M. W. Curtis. Sep 64, 172p
Proj. 1E6 40306D488, Tasks 1G640396D48812 02
1E6 40306D488 12
USAEL ECOM2482
Unclassified report

Descriptors: (*Radio receivers, Miniature electronic equipment), (*Radio transmitters, Miniature electronic equipment), Military requirements, Specifications, Frequency modulation, Transistors, Performance (Engineering), Radio communication systems, Army, Design, Portable, Helmets.

Engineering models of the Squad Radio, Radio Receivers AN/PRR-9 and Radio Transmitters AN/PRT-4, were developed within USAEL in the period May-October, 1962. The report of this development describes the history of the requirement for this equipment and details of the engineering development, including the test data on the end items. (Author)

6. Detection

AD-608 014 Div. 6, 24, 28
OTS Prices: HC $1.00/MF $0.50

Physical Research Labs., Boston Univ., Mass.
HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION.
Interim engineering rept. no. 5, 1 Sep-30 Nov 57, by E. J. Robinson. 30 Nov 57, 16p
Contract AF30 602 1579

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photointerpretation, Human engineering), (*Detection, Photointerpretation), Visual signals, Target recognition, Display systems, Viewing screens, Images, Photographic film, Visual acuity, Performance (Human).

Contents: The effect of magnification on the detection and recognition of photographic detail, and the influence of film movement on detection and recognition of visual target displays.

AD-608 021 Div. 6, 25
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
MATHEMATICAL STUDY OF BACKGROUND 'NOISE', by Philip R. Karr. 22 Apr 57, 31p

Unclassified report

Prepared for presentation at meeting of the East Coast Infrared Information Symposia (IRIS) (2nd), 26 April 1957, at Wright Air Development Center, Ohio.

Descriptors: (*Infrared radiation, Background), (*Optical scanning, Noise), (*Noise, Optical scanning), (*Statistical functions, Integral transforms), Power series, Series, Time, Fourier analysis, Reticles.

In designing guidance or detection systems, an important aid towards optimal or quasi-optimal design is a knowledge of the properties of the background in which the system must work. The present paper is concerned with the effect of background gradients on infrared systems that use a rotating reticle in the focal plane of a scanning system as an aid in discriminating against background signals in favor of desired or target signals. The background radiation is regarded here as a two-dimensional random function of space or angular variables. The scanning and rotating action may be said to convert the background or input random process or 'noise' into a new noise process at the output side of the reticle. If this output noise can be described in terms of an output correlation function or power spectrum, it becomes possible, in a limited sense, to calculate the effect of processing by photoconductive cells, amplifiers and the like. Thus, the system analysis stage of design may be facilitated and possibly a little progress made toward more sophisticated solutions of the design synthesis problem.

AD-608 038 Div. 6, 8
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
HIGH RANGE RESOLUTION COHERENT RADAR, by Samuel E. Craig. Jun 64, 31p
USAEL TR2496

Unclassified report

Descriptors: (*Coherent radar, Target discrimination), (*Target discrimination, Coherent radar), X band, Klystrons, Radar equipment, Range finding, Wiring diagrams, Pulse generators, Display systems, Oscilloscopes, Radar antennas, Combat surveillance, Alignment, Power supplies, Video amplifiers, Crystal mixers, Tuning devices.

An experimental coherent radar was assembled to investigate the value of high range resolution, without comparable azimuthal resolution, in differentiating between natural targets and man-made targets. A pulsed varactor diode in a microwave switch was used to modulate the output of a CW klystron. The peak power output was about 100 milliwatts. The best range resolution obtained was about three feet. Since the system used coherent detection, any target motion appeared quite clearly on the A-scope presentation. A distinct difference could be seen between the return from a steadily moving target such as a vehicle and the return from an irregularly moving target such as a tree branch or foliage swaying in the wind. A range resolution of 15 feet was found to be insufficient to show any clear differences between a walking man and a moving vehicle. With a six-foot range resolution, however, the return from a moving vehicle began to show more than one peak. With the three-foot resolution, a vehicle might show as many as four or five peaks. An intensity-modulated raster display was used for part of the tests. This type of display, which presented the relative phases of the separate returns from a target where the resolution was fine enough to produce more than one return, also indicated the possibility of showing whether a slowly-moving target was approaching or receding. The use of different types of vehicles at varying aspects is recommended for further evaluation of the high range resolution technique. Reduction in equipment size and weight to provide portability is also recommended. (Author)

AD-608 056 Div. 6, 8
OTS Prices: HC $3.00/MF $0.75

Mitre Corp., Bedford, Mass.
PHASE AND ENVELOPE OF LINEAR FM PULSE-COMPRESSION SIGNALS FROM HIGH-VELOCITY TARGETS,
by M. H. Ueberschaer. Nov 64, 64p TM-03916
Contract AF19 628 2390, Proj. 750
ESD TDR64 128

Unclassified report

Descriptors: (*Pulse compression, Radar signals), (*Radar signals, Pulse compression), Wave transmission, Linear systems, Frequency modulation, Radar equipment, Range finding, Radar echo areas, Doppler effect, Time-lag theory, Targets, Satellites (Artificial), Numerical analysis, Integrals, Fourier analysis.

Equations for the phase and envelope of the output signal from a linear filter, matched to the transmitted signal, were derived. The transmitted signal is assumed to have a flat band-limited amplitude spectrum and a linear group delay. The input to the 'matched filter' is the radar echo returned from a moving target whose velocity is essentially constant during the illumination time. It was shown that the returned signal is related to the transmitted signal by a time dilation. The resulting expressions for the phase and envelope are functions which involve Fresnel integrals. Approximations for these expressions were worked out. They were shown to be similar in form to those which are obtained when the returned signal is assumed to be related to the transmitted signal by a Doppler shift. (Author)

AD-608 084 Div. 6, 8, 30
OTS Prices: HC $5.00/MF $1.00

Burroughs Corp., Paoli, Pa.

RADAR VIDEO DIGITIZER AND AZIMUTH DIGITIZER.
Final rept.,
by Paul D. Pasquine. Apr 64, 153p
Contract FA WA4697, Proj. 105 200D
FAA RD64 124

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Airport radar systems, Computers), (*Air traffic control systems, Radar equipment), (*Data processing systems, Targets), Video metworks, Azimuth, Radar signals, Computer logic, Voltage, Statistical processes, Digital systems, Design, Production, Tests.

The report covers the design, fabrications, and preliminary acceptance testing of an automatic target data processor comprising one Radar Video Digitizer (RVD) and one Azimuth Digitizer (AD). The processor, a part of the Advanced Radar Traffic Control System (ARTS) at the Atlanta Terminal Area Tower, accepts radar video and azimuth synchro voltages from an Airport Surveillance Radar (ASR), processes the video, and furnishes a target coordinate message in a format suitable for input to the Track-While-Scan Computer (TWSC). The equipment is also designed to function with an Air Route Surveillance Radar (ARSR). The RVD uses statistical methods in detecting targets and incorporates an automatic clutter elimination feature (ACE) which assures a high probability of detecting those targets otherwise obscured by thermal noise or clutter. Targets are detected by an advanced, double-threshold method.

AD-608 275 Div. 6, 2, 20
OTS Prices: HC $4.00/MF $0.75

Massachusetts Inst. of Tech., Cambridge.
SEISMIC ARRAYS FOR THE DETECTION OF NUCLEAR EXPLOSIONS.
Scientific rept. no. 8,
by E. A. Robinson. 30 Jun 64, 108p
Contract AF19 604 7378, Proj. 8652, ARPA Order 180 61, Task 865203
AFCRL 64 855
Rept. on Proj. Vela-Uniform. Unclassified report

Descriptors: (*Nuclear explosions, Detection), (*Seismic waves, Detection), Antennas, Theory, Signal-to-noise ratio, Polynomials, Statistical distributions, Recursive functions.

Seismic arrays are multichannel sensor patterns immersed in a multi-dimensional signal-noise field and the analytic problem is hence analogous to that of radar antennas. The subject is thus opened first by a review of antenna theory. The general optimization problem for multichannel data leads to large systems of normal equations of Toeplitz form (as presented in previous reports) which require recursion solution techniques to be computationally feasible. Such techniques are elaborated here in terms of polynomials orthogonal on the unit circle. The specific seismic array problem is then considered in terms of plane-wave-front signal and noise contributions plus incoherent noise, and details of the 'velocity filtering' method are presented. Spectral estimation from finite array measurements is the final question considered, including relations between continuous and discrete aperture functions, and the tabulation of aperture functions with their windows. (Author)

AD-608 349 Div. 6
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
ON THE ESTIMATION OF LOCATION COORDINATES FROM DATA TAKEN FROM A MANNED ORBITAL LABORATORY,
by S. C. Saunders and D. L. Johnson. Aug 64, 46p
Boeing-Math-363, D1-82-0370

Unclassified report

Also available from the authors.

Descriptors: (*Position finding, Surface targets), (*Manned spacecraft, Position finding), Numerical methods and procedures, Tracking, Errors, Statistical processes, Target acquisition, Reconnaissance satellites, Direction finding.

Statistical estimates are developed for the position of a moving surface target at any time from observations, subject to random errors, taken of its position from a manned orbital laboratory (MOL). The exact position of the MOL, being determined by observations subject to random errors, is also unknown. To develop the estimates, the simplifying assumption that the earth's surface is a plane and that the target moves linearly are made. The further assumption is made that the estimated coordinates of position of the target from the MOL are jointly normal as are the observations of the postion of the MOL from the ground. The observations are independent but may have different distributions. From the equations derived, it is possible to decide, in a given situation with known accuracies of the radars involved, whether it is better to make an estimate of the direction of travel with each pass or to estimate position only and to estimate the direction of travel after collecting the position data on subsequent passes. Also from the equations developed, how much an increase in the number of observations will increase the accuracy of the estimated position and direction can be determined.

AD-608 354 Div. 6
OTS Prices: HC $4.00/MF $1.00

Applied Physics Lab., JHU, Silver Spring, Md.
SUPPLEMENT TO MARCUM'S AND SWERLING'S DATA ON TARGET DETECTION BY A PULSED RADAR.
Tables,
by L. F. Fehlner. Sep 64, 132p TG-451A
Contract NOw62 0604c

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-602 121.

Descriptors: (*Target discrimination, Radar targets), (*Radar pulse Detection), (*Tables, Target discrimination), Signal-to-noise ratio, Gain, Ranges (Distance), Noise (Radar), Pulse integration, Data.

This report is a supplement to AD-602 121 entitled 'Marcum's and Swerling's Data on Target Detection by a Pulsed Radar.' In AD-602 121, graphed data are presented which were obtained by high speed digital calculations based on the statistical analyses of Marcum and Swerling. To accommodate those who have need for precise analytic data on radar target detection, the data which were plotted in AD-602 121 are presented here in tabulated form; and in addition, data are presented for 6000 pulses integrated incoherently.

AD-608 412 Div. 6, 25
OTS Prices: HC $3.00/MF $0.75

Sylvania Electric Products, Inc., Mountain View, Calif.
OPTIMIZED COHERENT OPTICAL RECEIVER TECHNIQUES.

Final rept.
by Mahlon B. Fisher. Oct 64, 73p
Contract AF30 602 3162, Proj. 4506, Task 450602
RADC TDR64 390
Unclassified report

See also AD-603 278.

Descriptors: (*Lasers, Coherent radar), (*Phototubes, Radar receivers), (*Coherent radar, Lasers), Radar equipment, Optical equipment, Image tubes, Microwaves, Light, Modulation, Demodulation, Electron guns, Traveling-wave tubes, Photocathodes, Scanning, Doppler effect.

Photodetectors for use in coherent optical radar systems are discussed. The requirements for this application include imaging capability to provide angular position information and wide bandwidth to follow large doppler frequency shifts. The photodetector developed during this program is a combination of an image dissector electron gun and a traveling-wave amplifier. The image dissector electron gun with a one-inch diameter photosurface was designed and evaluated during the first phase of the program. This electron gun was successfully operated as a video detector with a resolution comparable to present television standards. The complete scannable photodetector, including a helical slow-wave structure, was designed and fabricated. The device was evaluated in a direct optical modulation-demodulation experiment with a modulation frequency of 10.7 Gc. The detection of microwave-modulated light signals at any point on the photocathode was demonstrated with the tube operating in the scanning mode. A simultaneous display of video position signal and microwave modulation signal was achieved in a system simulating a radar receiver. (Author)

AD-608 429 Div. 6, 8, 30
OTS Prices: HC $4.00/MF $0.75

General Dynamics/Fort Worth, Tex.
INVESTIGATION OF MEASUREMENT ERRORS OF THE RAT SCAT CROSS SECTION FACILITY.
Rept. no. 7 (final),
by C. C. Freeny, T. R. Leeth, J. W. Jones and M. F. Brust. Jul 64, 119p FZE-222-7
Contract AF30 602 2831, Proj. 6503
RADC TDR64 397 Unclassified report

Descriptors: (*Radar echo areas, Errors), Test facilities, Rnages (Establishments), Radar antennas, Radar targets, Geometric forms, Background, Instrumentation, Calibration, Radar interference, Antenna radiation patterns.

The contents of the report relate the test programs and results therefrom of the RAT SCAT research and development program instigated to investigate the measuring fields as a function of range geometry, and measurement accuracies, of the RAT SCAT cross section measurement facility. A model for the field over the target region involving antenna height, antenna size, target height, frequency and distance to the target is presented along with appropriate measured data. These models are in most cases standard first order approximations used in estimating fields on a ground plane range. Major potential errors are classified into four categories for which investigations were conducted. In most cases theoretical error models were developed in terms of parameters which could be obtained from experiments conducted at the RAT SCAT Site. The test programs and results therefrom are presented for each of the four types of errors investigated as well as the ground plane model. Based on results obtained using measured data, conclusions and recommendations arising from the various areas of investigations are given. (Author)

7. Electrical Equipment

AD-608 061 Div. 7, 26
OTS Prices: HC $5.00/MF $1.00

Pratt and Whitney Aircraft, East Hartford, Conn.
LIQUID METAL-HEATED SPACE RADIATOR-MOUNTED THERMIONIC GENERATOR.
Rept. for 1 Jul 63-30 Jun 64,
by F. C. Harter. Oct 64, 158p PWA-2369
Contract AF33 657 11320, Proj. 8173, Task 81730525
APL TDR64 121

Unclassified report

Descriptors: (*Thermionic converters, Generators), (*Liquid metals, Heating), (*Power equipment, Thermionic converters), High-temperature research, Radiators, Nickel, Tantalum alloys, Tungsten alloys, Beryllium compounds, Oxides, Rhenium alloys, Cylindrical bodies, Voltage, Cooling, Simulation, Manufacturing methods, Test methods, Design.

The program was conducted to evaluate thermionic generators in a configuration appropriate for liquid metal heating at temperatures up to 1500C. The thermionic generator evaluated was cylindrical and consisted of a nickel collector surrounding a trilayer emitter structure. The trilayer structure consisted of a tantalum-tungsten alloy tube, which could contain the liquid metal, surrounded by a concentric insulating beryllium-oxide tube and a tungsten-rhenium alloy emitter tube. The generator met or exceeded the performance goals of the program. At an emitter temperature of 1500C, the power density measured was 50 percent greater than the design objective of 4 W/square cm, and the measured efficiency matched the goal of 10 per cent. The power density of 1.07 W/square cm at 1195C exceeded the performance goal of 1 W/square cm at 1200C. The generators were tested under conditions which simulated liquid metal heating and radiation cooling of the generators. Strong electronic and thermal interrelations were observed during these tests, significant discontinuities were found in the current-voltage relationship, and a thermal quasi-instability was observed resulting from variations in the electronic heating of the collector.

AD-608 172 Div. 7, 8, 31
OTS Prices: HC $1.00/MF $0.50

American Monarch Corp., Minneapolis, Minn.
MULTI-STATION PUSH BUTTON SWITCH.
Interim development rept. for 1 Jul-30 Sep 64,
by John Weiss. 30 Sep 64, 15p
Contract NObs89440, Proj. SR0080302, Task 9633

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electric switches, Design), Electronic equipment, Ship auxiliary equipment.

A 2- and 10-station, mechanical-interlocked and sealed push-button switch assembly is being developed to have illumination and snap action also. Each station is to have as many as 6 double-pole, miniature switch circuits, a front removable lens and lamp unit, requiring no tools for removal, and all circuitry associated with the lamp and miniature switches. A counteracting mechanism was designed having the differential travel space required for the teaseproof function placed opposite the button, thereby putting all lock-out and actuating functions on the same side of the pivot. The button is then a floating member, serving only as a balancing means of transferring the button force applied through the pivot to the cone and actuator.

AD-608 213 Div. 7, 12, 14, 25
OTS Prices: HC $1.50/MF $0.75

Naval Research Lab., Washington, D. C.
ELECTRON-BOMBARDMENT DAMAGE IN SILICON SOLAR CELLS.
Final rept.,
by R. L. Statler. 7 Oct 64, 62p
Projs. SF013 12 04 4533, SR007 11 01 0549
NRL 6091

Unclassified report

Descriptors: (*Solar cells, Radiation damage), (*Silicon, Electron bombardment), Semiconductor devices, Electrical properties, Photoelectric effect, Satellites (Artificial), Power supplies.

A study was made of the radiation damage in 11 types of silicon solar cells as a result of 1-Mev electron bombardment. Included in the study are p/n cells, n/p cells of different bulk resistivities, planar cells, and drift-field cells. A comparative analysis was made of the radiation-induced degradation in these cells as a function of short-circuit current, maximum power output, minority-carrier diffusion length, and photovoltaic spectral response. The p/n cells were found to be much more sensitive to radiation damage than any type of n/p cells in this investigation. In th n/p cells, there is a definite indication of increasing radiation resistance accompanying increasing values of bulk resistivity, up to 10 ohm-cm. The drift-field solar cells exhibit a further improvement in radiation resistance beyond that of the other types of n/p cells. (Author)

AD-608 233 Div. 7, 26, 31
OTS Prices: HC $4.00/MF $0.75

Societe Rateau, La Courneuve (France).
FEASIBILITY STUDY FOR A STEAM LUBRICATED BEARING 625 KVA/400c/s TURBOGENERATOR.
Mar 64, 102p
Contract N62558 3691

Unclassified report

Descriptors: (*Generators, Feasibility studies), (*Turbines, Generators), Alternating current, Production, Gas bearings, Thrust bearings, Steam, Lubrication, Power equipment, Steam turbines, Shipborne, Military requirements.

Contents:
Facilities available to the Rateau Company for constituting a prototype
Layout of the turbo-generator
Description and calculations vindicating the tentative design
Increasing the scope of the study
Schedule for constructing a prototype.

AD-608 239 Div. 7, 10, 12
OTS Prices: HC $1.00/MF $0.50

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL.
Quarterly technical progress rept. no. 4, 1 Aug-31 Oct 64.
16 Nov 64, 24p
Contract AF33 615 1185, Proj. 8173, Task 817303

Unclassified report

Descriptors: (*Fuel cells, Design), (*Hydrogen, Fuel cells), (*Oxygen, Fuel cells), Capillary tubes, Temperature control, Satellites (Artificial), Spacecraft, Electric power production, Wiring diagrams, Tests.

During this period Static Orbital Package Number 1

was given a final check-out for the scheduled orbital flight. This package has been returned to the vehicle contractor for installation on an orbital vehicle. Fabrication of the 28-volt fuel cell power systems is nearing completion. The first fuel cell stack will be assembled during the first week in November. Testing of the 28-volt modules will begin after assembly. The fuel cell analyzer will be completed by mid-November. (Author)

AD-608 468 Div. 7, 14, 25
OTS Prices: HC $2.00/MF $0.50

Harshaw Chemical Co., Cleveland, Ohio.
RESEARCH ON PHOTOVOLTAIC CELLS.
Interim rept. for 1 May 63-30 Apr 64,
by Norman E. Heyerdahl, Donald J. Harvey, and Roger F. Belt. Oct 64, 32p
Contract AF33 657 7916, Proj. 7885, Task 7885 02
ARL 64 142

Unclassified report

Descriptors: (*Photoelectric cells (Semiconductor), Materials), Zinc alloys, Films, Gallium alloys, Arsenic alloys, Zinc compounds, Selenides, Cadmium compounds, Tellurides, Vapor plating, Selenium alloys, Evaporation, Resistance (Electrical), Absorption spectrum, Hall effect, Single crystals, X-ray diffraction analysis, Cadmium alloys, Tellurium alloys.

The report describes research and development on thin film photovoltaic cells. GaAs, ZnSe, and CdTe films were prepared by vacuum co-evaporation of the elemental constituents. Measurements of resistivity, absorption edge, x-ray diffraction pattern and Hall effect are described. Photovoltaic barriers were prepared on CdTe thin films and ZnSe single crystals by reaction with an aqueous solution containing copper ions. Measurements of I-V curve and spectral response are given. Preliminary measurements in CdS and ZnSe single crystals by x-ray diffraction topography are discussed. (Author)

AD-608 471 Div. 7, 12, 17
OTS Prices: HC $3.00/MF $0.75

Melpar, Inc., Falls Church, Va.
2000F POWER WIRE FOR AEROSPACE ENVIRONMENT.
Final rept. for 1 Apr 63-30 Sep 64,
by K. M. Zwilsky, N. Fuschillo, H. Hahn, P. J. Lare, and J. L. Pentecost. Nov 64, 86p
Contract AF33 657 11046, Proj. 8128, Task 812806
APL TR64 127

See also AD-602 144.

Unclassified report

Descriptors: (*Electric wire, Space environmental conditions), (*Rhodium, Electric wire), (*Magnesium compounds, Electric insulation), (*Metal coating, Platinum), Electrical properties, Resistance (Electrical), Environmental tests, Vibrations, Shock (Mechanics), Acceleration, Humidity, Thermal stresses, High temperature research, Low pressure research, Oxides, Seals, Aluminum, Ceramic materials.

Twenty-two gage and twelve-gage power wires fabricated using rhodium conductors, magnesium oxide insulation, platinum sheathing, and alumina end seals. The wire systems maintained their electrical integrity through a variety of environmental tests including vibration, mechanical shock, acceleration, humidity, vacuum, and nuclear radiation. The wires were operated successfully at temperatures up to and including 2000F. Rated current was determined and assigned as 10 amperes for 22-gage and 60 amperes for 12-gage wires. The wires passed the final cyclic test of carrying rated current at room temperature for two hours, at high vacuum for twenty-five hours and at a reduced pressure at 2000F for three hours. (Author)

8. Electronics and Electronic Equipment

AD-607 995 Div. 8, 25, 27
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
THE NONLINEAR PROPAGATION OF STRONG ELECTROMAGNETIC WAVES THROUGH WEAKLY IONIZED MEDIA,
by Paul Molmud. 14 Oct 59, 29p
STL/TM-59-0000-00397

Unclassified report

Descriptors: (*Plasma medium, Wave transmission), (*Electromagnetic waves, Plasma medium), (*Exhaust gases, Wave transmission), Ionization, Water vapor, Attenuation, Partial differential equations, Signals, Transport properties, Spacecraft, Guided missiles, Radiofrequency power, Electrons, Propagation.

This paper presents a theoretical treatment of the nonlinear propagation of strong electromagnetic waves through weakly ionized water vapor. It shows that when the parameters of propagation are held within certain constraints, analytical solutions may be obtained which describe the amplitude of such waves. These solutions are applied to the question of propagation through rocket exhaust gases. A novel method is described for altering the attenuation experienced by a signal sent from the ground, through the exhaust gases, to the missile. This is accomplished by broadcasting a powerful 'sacrificial' wave from the missile to alter the electrical characteristics of the exhaust. (Author)

AD-608 010 Div. 8
OTS Prices: HC $3.00/MF $0.75

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
LINE-OF-SIGHT PROPAGATION PHENOMENA,
by Albert D. Wheelon and R. B. Muchmore. 1954, 64p

Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), Microwave communication systems, Radiofrequency interference, Atmospheric precipitation, Turbulence, Clouds, Scattering, Phase shift, Radiofrequency power, Distribution, Multipath transmission, Atmosphere models.

Turbulent and precipitation conditions in the real atmosphere are considered in their effect on the line-of-sight propagation of electromagnetic waves. It is found that tropospheric scattering and phase scintillation mechanisms place an interesting limit on the accuracy with which one may determine the angular position of a distant radiator. Superposition of the same perturbed signals gives rise to waveform distortion in communication systems. Theoretical expressions for angular power distributions and phase error spectra are derived from phenomenological atmospheric models. Ray bending by cloud formations and rainstorms is also computed for representative weather conditions. (Author)

AD-608 017 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
RAMO-WOOLDRIDGE GENERAL RESEARCH PROGRAM, 1959. A. MILLIMETER WAVES AND PLASMAS.
Progress rept.,
by I. Kaufman, D. Douthett, A. Risley, and H. C. Corben.
1 Mar 60, 28p

Unclassified report

Descriptors: (*Microwaves, Scientific research), (*Plasma medium, Resonance), Radiofrequency generators, Microwave amplifiers, Harmonic oscillators, Ferromagnetic materials, Cavity resonators, Magnetic resonance, Waveguides, Plasma oscillations.

Contents:
Large sample ferrite experiments; Basic experiments in ferrite harmonic generation; Influence of electric fields on ferromagnetic resonance; Harmonic enhancement; Generation of higher harmonics by a ferrite; Millimeter waves; Plasma resonance.

AD-608 020 Div. 8
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
THE RAMO WOOLDRIDGE CORPORATION GENERAL RESEARCH PROGRAM 1957. B. MILLIMETER WAVES,
by I. Kaufman and H. Wachowski. Jan 58, 12p

Unclassified report

Descriptors: (*Millimeter waves, Scientific research), Waveform generators, Electromagnetic waves, Amplifiers, Measurements, Tuning devices, Plasma oscillations, Magnetic fields, Electron beams, Microwave equipment.

A progress report on the investigations of methods for generation and detection of Millimeter Waves being conducted by the Electronic Research Laboratory of the Ramo-Wooldridge Corporation. (Author)

AD-608 037 Div. 8
OTS Prices: HC $2.00/MF $0.50

Raytheon Co., Waltham, Mass.
HIGH FREQUENCY TUNNEL DEVICE STUDY,
by S. R. Steele and A. Starr. Sep 64, 40p
Contract AF30 602 3249, Proj. 5573, Task 557301
RADC TDR64 285

Unclassified report

Descriptors: (*Microwave amplifiers, Tunneling (Electronics)), (*Tunneling (Electronics), Microwave amplifiers), Feasibility studies, Cathodes (Electron tubes), Life expectancy, Microwave equipment, High frequency, Metal films, Gold, Aluminum, Iridium, Electric insulation, Field emission, Quantum mechanics, Noise (Radio), Electric currents, Voltage, Manufacturing methods, Test methods, Aluminum compounds, Oxides.

The work reported here is aimed at investigating the feasibility of achieving low-noise microwave amplification by using tunneling. As a result of a previous contract it has been concluded that a promising approach to achieving these objectives is the use of a thin-film cathode operating in conjunction with a microwave structure. At present it is possible to build tunnel cathodes that exhibit sufficient current density to permit their use in a traveling wave tube. However, the life of the cathodes in either continuous or pulsed operation is unsatisfactory. The efforts during this quarter have been aimed at solving the life problem. Measurements of the lifetimes of Al-Al2O3-Au tunnel cathodes have been obtained with pulse durations varying from 200 microseconds to 100 milliseconds, with duty cycles ranging from 0.001 to 0.1 and with sandwich current densities ranging from 0.5 amperes/ssq cm to 5 amperes/sq cm. As the testing proceeded the devices

usually showed increased efficiencies for a time, then a rapid deterioration. At constant sandwich voltages, the sandwich currents generally remained approximately constant during the early stages of life, then gradually increased. The data showed some consistency when the emission current at constant voltage was plotted against the total charge passing through the device. (Author)

AD-608 046 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOME QUESTIONS ABOUT THE NOISE STABILITY OF THE FUNCTIONS OF ALGEBRA OF LOGIC,
by A. V. Petrosyan. 15 Oct 64, 11p
FTD TT64 675; TT 64 71662
Unclassified report

Unedited rough draft trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Doklady, 1963, v. 36, no. 3, p. 147-151.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Communication theory, Mathematical logic), (*Mathematical logic, Communication theory), Data transmission systems, Noise (Radio), Stability, Redundant components, Algebra, Special functions (Mathematical), USSR.

This work examined the questions of the reprocessing of information by the functions of the algebra of logic from the point of view of their noise stability. Moreover, it was shown that any function of the algebra of logic can be connected to some continuous function characterizing the noise stability of a given function, that the noise stability of all functions of the algebra of logic (without excess) has one and the same order of smallness, and that the noise stability of the function can be increased only by the introduction of redundancy. At the end of the work it was shown that for any function of the algebra of logic one can construct another function of the algebra of logic with excess reprocessing the information as the given function but possessing noise stability of a higher order.

AD-608 054 Div. 8
OTS Prices: HC $3.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
BROADBAND MICROWAVE POWER LIMITERS.
Quarterly rept. no. 5, 1 Jul-30 Sep 64,
by L. Nathanson. 30 Sep 64, 32p
Contract NObsr89462, Proj. SR0080302, Task 9637
Unclassified report

Descriptors: (*Resistors, Coupling circuits), (*Limiters, Radiofrequency power), Diodes, Broadband, Microwaves, L band, S band, Experimental data, Heating.

The effects of the value of the coupling loop terminating resistor are discussed, and experimental data pertaining to four L/S-band coupling loops are presented. Data are also included with reference to low level and high power measurements of fourteen PIN limiting diodes in the 6.25-ohm line section of the L/S-band limiter. (Author)

AD-608 097 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Linde Div., Union Carbide Corp., Cleveland, Ohio.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVED RELIABILITY OF SOLID TANTALUM CAPACITORS.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 64,
by J. E. Riley. 30 Sep 64, 40p
Contract DA36 039AMC03624E
Unclassified report

See also AD-604 998.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Reliability (Electronics), Tantalum, Powder metals, Voltage, Anodes, Impregnation, Powder metallurgy.

Data are presented showing the relative capabilities of the various vendors' materials. These include finished device parameters and formation breakdown voltage. Under the formation studies, a method was developed which precisely determines the relative forming voltage ability of sintered anodes, regardless of size, weight, density, etc. This method is fully described herein. All experimental data accumulated to date are presented, with the area of process study noted for each experiment. (Author)

AD-608 113 Div. 8, 5
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Elmira, N.Y.
EXPLORATORY DEVELOPMENT OF HIGH RESOLUTION TELEVISION CAMERA TUBES.
Interim engineering rept. no. 1, 11 May-10 Sep 64,
by M.Green. 10 Sep 64, 24p
Contract AF33 615 1271
Unclassified report

Descriptors: (*Television equipment, Camera tubes), (*Camera tubes, Design), Pictures, Scanning, Resolution, Electron microscopes, Secondary emission, Test equipment (Electronics), Electromagnetic lenses.

The work performed sought to establish current limitations in two areas vital to the development of a high resolution secondary electron conduction (SEC) camera tube; structure in the SEC target and overall performance in a magnetically focused tube. In addition, test equipment was designed and constructed to facilitate further development of the SEC target. (Author)

AD-608 128 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
STUDIES IN MICROWAVE PHYSICS.
Final rept.,
by Herman Farber and Leo M. Silber. Sep 64, 47p
PIBMRI-1241-64
Contract Nonr839 35, Proj. NR372 501
Unclassified report

Descriptors: (*Microwaves, Plasma physics), (*Waveguides, Cavity resonators), (*Ferromagnetic materials, Films), Gases, Dissociation, High-pressure research, Radiofrequency power, Field emission, Electric fields, Electric discharges, Metal films, Nickel compounds, Ferrates, Thickness, Porosity, Magnetic properties, Magnetic resonance.

Studies on the breakdown strength of high pressure gases at microwave frequencies and the interaction of high microwave powers with plasmas were initiated. Design

of suitable microwave cavities are discussed and construction details are presented. Preliminary measurements and complete construction details are presented. Theoretical arguments show that the magnetization of a thin ferromagnetic film should decrease with thickness, going to zero for a two dimensional film. An attempt was made to observe the thickness variation in a ferrite, $NiFe_2O_4$, by means of ferromagnetic resonance. A method was found by which we could make films of uniform composition, but the formation of air pores could not be prevented. A decrease in magnetization in the films of apparent thickness was observed below about 6000A. Though the measured magnetization could not be corrected for porosity in an exact manner, the tabulated results indicate qualitatively how the transition from bulk takes place. (Author)

AD-608 130 Div. 8
OTS Prices: HC $3.00/MF $0.75

Westinghouse Electric Corp., Elmira, N. Y.
DESIGN AND DEVELOPMENT INVESTIGATIONS OF A LOW NOISE, LINEAR, VARIABLE GAIN, R. F. AMPLIFIER TUBE.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 64,
by J. P. Pietrzyk, A. van der Jagt, and R. L. Pear.
20 Oct 64, 66p
Contract NObsr89530, Proj. SS296004, Task 7481
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radiofrequency amplifiers, Electron tubes), (*Electron tubes, Radiofrequency amplifiers), Noise (Radio), Automatic gain control, Electron tube parts, Radiofrequency power, Power, Performance (Engineering).

In order to assess the requirements of the tubes for low interferences, an analysis was made of the power handling capability for cathode base, interbase and grid base circuitry. It was found that grid base operation should be applied only if the electronic loading is more important than the loading of 1/Gm. Based on the analysis, a figure of merit has been established which can be used for comparing different tube designs. Evaluation of construction A was continued, including life testing of tubes on high life line and measurement of shock, vibration, and fatigue in accordance with preliminary test specification. Dimensions of the electrodes of the tubes in construction D were determined, and lead inductance measurements for a 9-pin stem configuration were continued. The breadboard evaluation was completed, the R-390A receiver was modified and evaluated, and a comparison was made between tube types 6DC6 and WX4733.

AD-608 131 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
HIGH-FREQUENCY COMPENSATION OF TRANSISTORS,
by S. Deutsch, J. G. Corbellini, D. L. Greenberg, and A. M. Horn. Aug 64, 31p PIBMRI-1234-64
Contract AF49 638 1402
AFOSR 64 1831
Unclassified report

Descriptors: (*Transistors, Bandwidth), High frequency, Phase (Electronics), Inductance, Capacitance, Mathematical analysis, Circuits, Capacitors, Coils, Mathematical analysis.

If a relatively small collector load resistor is used, so that the gain of a transistor stage is low, the addition of a peaking coil yields substantial improvements in bandwidth or rise time. Still further improvements result from the use of a peaking capacitor in addition to the coil. Normalized values of L and C are derived for critically damped transient, maximally-flat amplitude and maximally-flat delay designs. The associated response curves are also given. (Author)

AD-608 140 Div. 8, 17, 25, 26
OTS Prices: HC $3.00/MF $0.75

Honeywell, Inc., Boston, Mass.
DEVELOPMENT OF SELF-REPAIR PROCEDURES.
Final rept. for Mar 63-Mar 64.
Sep 64, 89p
Contract AF30 602 3027, Proj. 5519, Task 551901
RADC TDR64 183
Unclassified report

Continuation of Contract AF30 602 2727.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronic equipment, Maintenance), (*Semiconductor devices, Maintainability), (*Coatings, Semiconductor devices), Resistors, Capacitors, Semiconductors, Diodes (Semiconductors), Electric wire, Automatic, Copper, Induction heating, Zone melting, Indium alloys, Gallium alloys, Aluminum alloys, Tin alloys, Magnesium alloys.

The automatic in-place repair of conductors, resistors, and inductors by the application of special purpose whisker growing and post coating alloys was investigated. Alloy compositions, and processing and application techniques were optimized for maximizing repair rates. Problems of practical application to operational systems were identified and evaluated. It was concluded that while the techniques investigated have only limited potential feasibility for general practical application, feasibility may exist for specialized applications. The repair of faulty semiconductor devices (diodes) by in-place remelting and rate growing using passive thermal gradients was investigated and found to be unfeasible for practical application. A literature search on capacitors revealed extensive prior work on the development of capacitors with the inherent capability for self-repair of certain types of failures. (Author)

AD-608 148 Div. 8, 25, 30
OTS Prices: HC $4.00/MF $0.75

Stanford Research Inst., Menlo Park, Calif.
MODES OF NEURISTOR PROPAGATION, A STUDY IN DISTRIBUTED ACTIVE PROCESSES.
Final rept.,
by M. W. Green and H. D. Crane. Sep 64, 116p
Contract Nonr3212 00, Proj. 3286
Unclassified report

Descriptors: (*Neuristors, Simulation), (*Transmission lines, Neuristors), Semiconductor devices, Negative resistance circuits, Electric discharges, Propagation, Perturbation theory, Transistors, Models (Simulations), Photoconductivity.

A neuristor line is a special form of physical system in corporating distributed active processes. Previous reports have shown how digital logic systems can be synthesized with networks of such lines. This report is not concerned with the logical aspects of neuristor networks but instead attempts to connect a variety of observations on neuristor and neural structure into one framework

based largely on a simplified model representation of a neuristor device. This model, consisting of a linear R-C transmission line with distributed shunt negative conductance processes, was selected because it is sufficiently simple to permit formal mathematical analysis and yet adequately complex to display many of the more interesting features of neuristor behavior. We begin with a discussion of negative conductance elements of the type one might employ in the modeling of a neuristor line. Questions relating to realizability, switching speed, and stability of individual elements and their distributed versions are discussed. Some common misconceptions concerning switching in negative conductance devices are pointed out in a detailed physical description of the switching process. We then proceed to mathematical descriptions of diffusion type (R-C) lines employing shunt active processes. A computer simulation procedure is presented in which we develop some criteria to be observed in obtaining accurate solutions when lumped-line representations are used to approximate smoothly distributed line parameters. These rules give convenient estimates of the time and distance increments one must employ to achieve a given degree of precision in the computer solution.

AD-608 174 Div. 8
OTS Prices: HC $3.00/MF $0.75

Philco Corp., Blue Bell, Pa.
NON-PLANAR ARRAY 'THINNING' STUDY.
Quarterly rept. no. 1,
by Charles E. Clarke and Thomas J. B. Shanley.
Oct 64, 75p Philco-2594.1
Contract AF30 602 3337, Proj. 4506, Task 450604
RADC TDR64 341

Unclassified report

Descriptors: (*Phased arrays, Antenna configurations), (*Radar antennas, Radar scanning), Antenna radiation patterns, Spheres, Hemispherical shells, Design, Mathematical models

The work reported herein includes (1) evaluation of a systematic method for locating the element positions in a filled-in spherical array based on icosohedral partitioning and preservation of symmetry; (2) Comparison and evaluation of various thinning procedures; (3) Formulation of analytical techniques for calculating the probabilities of main beam and side lobe performance; and (4) Partial completion of computer programs required to generate array patterns for mathematically thinned spherical arrays. The conclusions obtained to date are that maximum symmetry should be exploited to minimize the cost and complexity of spherical arrays, and that thinning rules must be designed which preserve as much useful symmetry as possible. (Author)

AD-608 176 Div. 8, 30
OTS Prices: HC $5.00/MF $1.25

Autonetics, Anaheim, Calif.
FAULT ISOLATION OF ELECTRONIC CIRCUITS USING TRANSFER FUNCTION METHODS,
by J. E. Valstar. Oct 64, 197p
Contract AF33 615 1070, Proj. 8119, Task 811927
APL TDR64 123

Unclassified report

Descriptors: (*Circuits, Test methods), (*Electronic equipment, Checkout procedures), (*Functions, Integral transforms), Operations research, Real time, Networks, Low-pass filters, Errors, Simulation, Fourier analysis, Transformations (Mathematics), Least squares method, Optimization, Programming (Computers), Maintenance, Linear systems.

Dynamic testing techniques based on operational calculus or transformation methods are potentially capable of extracting deterministic information about the status of a system from its input and output. Methods have been studied which by means of linear transformations of input and output generate numerical information about the polynomial coefficients in numerator and denominator of the system's transfer function. A unifying theory covering all methods based on linear transformations has been developed. Of specific interest are methods where the transformations are mechanized by means of physical networks (transformation filters), because of their possible simplicity and their real time properties. The simplest transformation filter is a low-pass RC network which basically performs a Leftsided Laplace Transformation. Methods extracting a large amount of information from just input and output are hampered by the propagation of observational errors into the solution of a pertinent set of equations. This propagation is in general amplificatory and if uncontrolled it easily becomes explosive. Methods have been worked out to minimize this error amplification. Minimum error amplification, however, increases with the number of polynomial coefficients and other factors determined by the physical structure of the system to be tested. (Author)

AD-608 177 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING PROCESS AND EQUIPMENT FOR CONSTRUCTION OF ELECTRON-TUBE MOUNTS.
Quarterly progress rept. no. 7 1 Jan-31 Mar 64,
by J. G. Thomas. 31 Mar 64, 19p
Contract DA36 039sc86741

Unclassified report

See also AD-606 706.

Descriptors: (*Welding, Ultrasonic radiation), (*Electron tubes, Welding), Electric connectors, Manufacturing methods, Electron tube parts.

Ultrasonic welding of the Type 6080WB electron-tube mount was reviewed by Tung-Sol representatives, and details are presented. The use of ultrasonic energy in the successful assembling of electron-tube components with interference fits is described. (Author)

AD-608 214 Div. 8
OTS Prices: HC $3.00/MF $0.75

Microwave Device and Physical Electronics Lab., Univ. of Utah, Salt Lake City.
A 36-40 kMc COUPLED LADDER BACKWARD-WAVE OSCILLATOR.
Rept. for Jul 62-Jul 64,
by R. W. Grow and L. S. Bowman. Oct 64, 62p
ASD-3
Contract AF33 657 8677, Proj. 4156, Task 415603
AL TDR64 225

Unclassified report

Descriptors: (*Backward-wave oscillators, Millimeter waves), Coupling circuits, Microwaves, Propagation, Molybdenum, Carbon, Mica, Electron beams, Feasibility studies.

Experimental results are reported for a four coupled-ladder backward-wave oscillator designed for the frequency band from 36-40 kMc. The voltage ranged from 14,000 to 20,000 volts and the power output was in excess of 20 watts at 40 kMc. The slow wave circuit consisted of four

0.005 in. think molybdenum planes separated by 0.010 in. with slots 0.142 in. wide having a pitch of 0.058 in. The electron beam was obtained by a convergent confined-flow cylindrical electron gun to eliminate beam rotation. The solid electron beam 0.116 in. in diameter flooded the ladder circuit with a measure current density of about 8 amps/sq. cm. The output terminal was constructed with the individual ladders becoming ridges of a ridge waveguide. This technique was utilized to phase lock the waves on each ladder to obtain output only from the longitudinal mode. Good agreement was obtained between the theoretical and experimental starting current, tuning curve, and power output. The good agreement thus obtained indicates that coupled ladder backward-wave oscillators can be built utilizing the available theoretical results and the serious problem of producing a pure longitudinal mode in a coupled ladders can be solved. (Author)

AD-608 218 Div. 8
OTS Prices: HC $3.00/MF $0.75

RCA Defense Electronic Products, Camden, N. J.
CERENKOV MICROWAVE GENERATOR.
Final technical documentary rept. for Dec 63-Jul 64,
by A. Boornard, J. M. Brumbaugh, J. J. Stekert, and L. W. Zelby. Oct 64, 74p
Contract AF30 602 3061, Proj. 4519, Task 451904
RADC TDR64 403

Unclassified report

Descriptors: (*Cerenkov radiation, Generators), (*Generators, Cerenkov radiation), Radiofrequency power, Microwave equipment, Waveguides, Dielectrics, Measurement, Electron beams, Harmonic analysis.

Measurements were made of the CW Cerenkov radiation generated by the interaction of a modulated ribbon electron beam with a dielectric reflection coupler. The coupler consists of two identical 1.27-cm wide slab sectors having an interaction length of 10cm. The dielectric coefficient of the coupler material is 15 at the beam modulation frequency of 6.33 Gc. Typical experimental parameters are: dc beam current, 0.30 ma; gun voltage plus potential well voltage, 70 kv; bunch rf power, 1.0 watt; and beam-to-dielectric separation, 0.16 cm. Separating the contribution of leakage radiation and resonance radiation from the detected power level gives 4.6 microwatts as the detected Cerenkov power for a typical experimental determination. The generated-to-detected power ratio is determined to be between 165 to 75. Using the calculated value of the beam current amplitude at 6.33 Gc yields 1,250 to 560 ohms/cm for the interaction resistance per unit length. The value of 1,250 ohms/cm is in good agreement with the interaction resistance predicted by the theory developed in previous work. (Author)

AD-608 221 Div. 8
OTS Prices: HC $1.00/MF $0.50

Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF A DOUBLE OCTAVE BANDWIDTH TRAVELING-WAVE TUBE AMPLIFIER.
Rept. no. 2,
by B. P. Israelsen and F. T. Mauch. Oct 64, 25p
Contract AF30 602 3261, Proj. 5573, Task 557301
RADC TDR64 411

Unclassified report

Descriptors: (*Traveling-wave tubes, Microwave amplifiers), (*Microwave amplifiers, Traveling-wave tubes), Broadband, Noise, Reduction, Electron tubes, Helixes, Voltage, Cathodes (Electron tubes), Feasibility studies, Electronics.

The purpose of this program is the attainment of low-noise amplification over two octaves in a single traveling-wave tube. Noise figure is to be less than 6 db from 2.0 to 8.0 Gc, with a minimum of ten milliwatts saturated power output. The work described in this report has been directed primarily at reducing noise figure to the 6 db specification, and at maintaining gain variation within the required ± 3 db. The dependence of these performance characteristics on helix voltage has necessitated that effort be placed on design and fabrication of a glass support tubing for the helix, using low-loss type 7070 glass. The purpose is to render synchronous helix voltage essentially constant over the entire two-octave band. In the experimental tubes evaluated, the importance of cathode geometry in the achievement of broadband low-noise operation is demonstrated. (Author)

AD-608 240 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Auburn, N. Y.
A PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY FOR DIFFUSED SILICON CONTROLLED SWITCHES TYPES 2N689.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 64,
by J. N. Frank, A. hishta, R. C. Rome, H. Wawrousek, and W. R. Comstock. 30 Sep 64, 28p
Contract DA36 039AMC03619E

Unclassified report

See also AD-601 442.

Descriptors: (*Electronic switches, Crystal rectifiers), (*Crystal rectifiers, Electronic switches), Silicon, Diffusion, Alloys, Transducers, Welding, Ultrasonic radiation, Crystal lattice defects, Surface properties, Crystal growth, Welds, Cathodes, Reliability (Electronics).

Deterioration of the ultrasonic welder tip was solved partially by use of a tungsten carbide tip in place of the Udimet tip. A weld schedule was established on the high-temperature glass housing to crimp and weld the gate and cathode tubes; no difference in setting was required for copper plated or unplated housings. Increasing the p-region surface concentration increased the possibility to obtain the dv/dt specification for the cathode junction without affecting other device parameters. Two interim life tests indicated that large-scale multilevel stress tests will be successful.

AD-608 248 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE QUESTION OF EXCITING LONGITUDINAL WAVES IN PLASMA BY RADIO WAVES,
by A. M. Fedorchenko. 8 Jul 64, 10p
FTD TT64 174; TT 65 60012

Unclassified report

Unedited rough draft trans. of Ukrayins'kyi Fizychnyi Zhurnal (USSR) 1963, v. 8, no. 5, p. 555-559.

Descriptors: (*Plasma oscillations, Excitation), (*Microwave amplifiers, Plasma physics), Radio waves, Electromagnetic waves, Electron beams, Energy, Vector analysis, USSR.

A calculation is made of the intensity of longitudinal plasma waves excited by the passage of transverse electromagnetic waves along the plasma boundary.

AD-608 261 Div. 8
OTS Prices: HC $3.00/MF $0.75

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ANTENNAS.
Quarterly progress rept. no. 7, 1 Mar-31 May 64, by James Rippin. Oct 64, 77p
Contract AF33 657 10474, Projs. 6278, 4028, Tasks 6278 01, 4028 24

Unclassified report

Descriptors: (*Antennas, Reports), Log periodic antennas, Slot antennas, Dipole antennas, Spiral antennas, Varactor diodes, Signal-to-noise ratio, Integrated circuits, Antenna radiation patterns, Waveguides, Millimeter waves, Omnidirectional antennas, Antenna components, Electrical impedance, Wave transmission, Helixes, Design, Conical antennas, Performance (Engineering) Mathematical models.

Topics included are: The observed properties of log-periodic antennas through experimental and analytical investigation of their uniform periodic counterparts; The development of a log-periodic array of cavity-backed slots which will produce vertically polarized radiation without having the structure projecting above the ground plane; An LP array of magnetic dipole elements; Design information about a class of periodic and log-periodic leaky wave structures which are potentially high-gain, frequency-independent antennas; Characteristics of present forms and new versions of the conical logarithmic spiral antenna; The basic characteristics of the multi-arm log-spiral antennas and their application in specific systems; The feasibility of utilizing varactor diodes in a backfire antenna to produce amplification in the antenna itself and thereby improve signal-to-noise performance; Wave propagation along helical conductors; A class of periodic structures for wide band applications; Investigation of a class of log-periodic structures; Radiation lens illuminated from a Goubau beam-waveguide; Radiation from circular waveguides; Omnidirectional and steerable beam antenna development at millimeter wavelengths; Millimeter antenna test instrumentation; Components for millimeter wave antennas.

AD-608 274 Div. 8
OTS Prices: HC $2.00/MF $0.50

Westinghouse Defense and Space Center, Baltimore, Md.
BACKSCATTER FLIGHT TEST PROGRAM REPORT, Oct 64, 40p WDSC-1878A

Unclassified report

Descriptors: (*Radar reflections, Very high frequency), (*Terrain, Reflection), Wave transmission, Radar antennas.

The backscatter measurement flight test was conducted to fill a gap in the existing terrain reflectivity data at VHF frequencies. A radar system, essentially consisting of a Navy type SK transmitter, a modified Vitro Model 1306 receiver, a TR device to keep the transmitted signal out of the receiver, and a broadbeam sidelooking antenna, was installed in a Beechcraft Queenair aircraft. Returns from flatland, water, city, mountain, and woods terrains were recorded on film. The receiving subsystem was calibrated and various parameters such as peak transmitted power, pulsewidth, and antenna pattern were measured. The film data was read out for downlook angles from 7 to 60 degrees. In general, the city and woods have the highest reflectivity and the flatland and water reflectivities are the lowest. A study of previous reports by NRL and SRI indicates that generalization of reflectivity data from a single area to a general terrain type can be misleading except in gross terms; i.e., ±10 db. (Author)

AD-608 282 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
CURRENTS, CHARGES, AND NEAR FIELDS OF CYLINDRICAL RECEIVING ANTENNAS,
by Ronold W. P. King. 19 Aug 64, 34p Cruft-TR-453
Contract Nonr1866 32, Proj. NR371 016

Unclassified report

Descriptors: (*Antennas, Cylindrical bodies), Electric currents, Electromagnetic fields, Radio-frequency, Hazards, Antenna radiation patterns, Numerical analysis, Trigonometry, Special functions (Mathematical), Integral equations, Admittance, Dipole antennas.

The cylindrical center-loaded receiving antenna in an incident linearly polarized plane-wave field was analyzed. Approximate expressions were obtained for the distributions of current and charge that involve three trigonometric terms with suitably defined coeffficients. These are much more accurate than the usual zero-order currents and charges, and much simpler than higher-order iterated solutions. The complex effective length was determined. Formulas were also obtained for the reradiated or scattered field very near the antenna in the important special case when the antenna lies in the plane of the incident wave front. These are useful in certain applications that involve radio frequency hazards. (Author)

AD-608 283 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
THE CYLINDRICAL ANTENNA WITH ARBITRARY DRIVING POINT,
by Ronold W. P. King and Tai Tsun Wu. Oct 64, 46p Cruft-Tr-455
Contract Nonr1866 32, Proj. NR371 016

Unclassified report

Descriptors: (*Antennas, Cylindrical bodies), (*Dipole antennas, Admittance), (*Admittance, Numerical analysis), Electric currents, Distribution, Design, Antenna feeds.

A new reasonably accurate approximate solution is obtained in trigonometric form of the distribution of current and the admittance of a cylindrical antenna when driven off cetner. The symmetrical problem (sleeve dipole) with two equal generators at the same distances from the center is solved first, then the antisymmetrical case with equal and opposite generators. A suitable superposition of the two results provides the solution for the dipole antenna when driven at an arbitrary point along its length. The results are sufficiently simple to be useful in the study of antennas with active or passive elements located along their length. (Author)

AD-608 286 Div. 8
OTS Prices: HC $1.00/MF $0.50

Air Force Avionics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
AN ACTIVE NETWORK FOR SYNTHESIS OF A CLASS OF RATIONAL FUNCTIONS,
by George R. Branner. Sep 64, 20p
Proj. 7031, Task 703103
AL TDR64 238

Unclassified report

Descriptors: (*Electrical networks, Synthesis), (*Functions, Synthesis), Resistance (Electrical), Capacitance, Networks, Theory, Circuits, Admittance,

Electrical impedance, Numerical analysis, Polynomials, Topology.

This report contains three techniques for synthesis of active Resistance Capacitance (RC) networks. The circuit configuration is a modification of one originally proposed by Sandberg (Synthesis of Driving Point Impedances with Active RC Networks). Basic theorems of RC active network synthesis are utilized in the realizations. Numerical examples are given in each case. (Author)

AD-608 288 Div. 8,15
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN INEQUALITY FOR CERTAIN CORRELATION FUNCTIONS.
Group rept.,
by R. T. Prosser. 29 Oct 64, 12p LL-1964-63
Contract AF19 628 500
ESD TDR64 566

Unclassified report

Descriptors: (*Inequalities, Statistical functions), (*Statistical functions, Inequalities), (*Varactor diodes, Optimization), Sequences, Real numbers, Permutations.

An inequality for certain types of generalized auto correlation functions, of interest in the study of varactor diodes, was established. (Author)

AD-608 297 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
A GRAPHICAL PROCEDURE FOR RELATING THE PERVEANCE AND POWER CHARACTERISTICS OF MICROWAVE TUBES,
by G. E. Wurthmann, P. Fischer, and P. Richmond.
Aug 64, 24p
Task 1P6 22001A055 04
USAEL TR2506

Unclassified report

Descriptors: (*Graphics, Microwave equipment), (*Microwave equipment, Electron tubes), (*Electron tubes, Microwave equipment), Radiofrequency power, Beams (Electromagnetic), Performance (Engineering), Power, Electric currents, Voltage.

A convenient, graphical method of determining important inter-related microwave tube parameters, such as power output, efficiency, perveance, current, and voltage, is presented. Pertinent tube characteristics are plotted on three overlapping, logarithm graphs, which offer a rapid, straightforward means of finding the desired parameters over a wide range of current, voltage, and power. The operational procedure for using the graphs in solving for the variables of interest is demonstrated by three illustrative examples. (Author)

AD-608 298 Div. 8
OTS Prices: HC $3.00/MF $0.75

Army Electronics Labs., Fort Monmouth, N. J.
SIGNAL AND NOISE PROPAGATION ON ACCELERATED BEAMS OF FINITE DIMENSIONS,
by Bruno Zotter. Aug 64, 58p
Task 1P6 22001A055 04 02
USAEL TR2494

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radio signals, Propagation), (*Noise (Radio), Propagation), (*Electron beams, Propagation), Diodes, Traveling wave tubes, Electron guns, Acceleration, Space charges, Partial differential equations, Electric currents, Density, Voltage.

The signal and noise propagation on a finite, accelerated electron beam in a diode space are calculated by a linearized field analysis. Approximate solutions are derived which show that the diode space behaves in general like a non-conservative transformation except for the case when the transit angle is a multiple of 2 pi. The transformation of the noise parameters S and pi is computed and the results can be applied to the design of low-noise electron guns for traveling-wave tubes. (Author)

AD-608 313 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Knights (James) Co., Sandwich, Ill.
STEP I COMPLETION REPORT FOR TIGHT TOLERANCE MINIATURE CRYSTAL UNITS 4.3 TO 20 MC,
by Roger E. Bennett and Don C. Schrader. Jul 64, 80p
Contract DA36 039sc75974

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Quartz resonators, Manufacturing methods), Miniature electronic equipment, Crystals, Crystal holders, Resonators, High frequency, Production, Electroplating, Tolerances (Mechanics), Specifications, Quality control, Machine shop practice, Instruction manuals.

The production of 2500 units in the frequency range 4.3 mc to 20 mc, enclosed in the small metal, HC-18/U, enclosure, and with a maximum frequency deviation from nominal of ± 25 parts per million from -55C to +105C is described. Yield data is given and losses are analyzed. (Author)

AD-608 320 Div. 8
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana. Engineering Experiment Station.
RADIATION FROM CIRCULAR WAVEGUIDES.
Technical rept. no. 83,
by Frank Fellinger. Nov 64, 66p
Contract AF33 657 10474, Proj. 6278, Task 627801

Unclassified report

Descriptors: (*Electromagnetic waves, Waveguides), (*Waveguides, Antenna feeds), Electromagnetic lenses, Lens antennas, Boundary value problems, Omnidirectional antennas, Antenna radiation patterns, Beams (Electromagnetic), Potential theory.

A simple aperture theory is developed and applied to the problem of radiation from a circular waveguide. First, the waveguide is considered to be in free space, and then in an infinite ground plane. The first approach is used to verify the developed aperture theory. Data on theoretical and experimental radiation patterns are presented. (Author)

AD-608 321 Div. 8, 15
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana. Engineering Experiment Station.

DISPERSIVE PROPERTY OF PERIODIC SLOT ARRAY AT THE INTERFACE BETWEEN TWO DIELECTRIC MEDIA.
Technical rept. no. 10,
by Hassan Morshed. Oct 64, 86p RRL-262
Contracts NObsr89229, NObsr85243

Unclassified report

Descriptors: (*Slot antennas, Antenna radiation patterns), (*Antenna radiation patterns, Slot antennas), (*Waveguide slots, Electromagnetic waves), Dielectrics, Antenna configurations, Yagi antennas, Mathematical models, Special functions (Mathematical), Integral transforms, Numerical analysis, Scanning.

Dispersion curves for a periodic slot array, of narrow slots, cut in an infinite conducting sheet and placed at the interface between two homogeneous, isotropic, and loss-free dielectrics, are obtained. The results are accomplished through the development of a determinantal equation which is stationary with respect to the longitudinal phase constant of the structure. This stationary determinantal equation is derived through the generalization of similar stationary relations for the propagation constant along a uniform continuous slot cut in a rectangular or a circular waveguide. The stationary property of this relation holds both for real and complex longitudinal phase constant. A somewhat lengthy Fourier transform approach has been employed to put the equation into a fast converging form, suitable for numerical analysis. The final determinantal equation is quite suitable for calculation by a high-speed digital computer. It is shown that not only a periodic slot array located at the interface between two dielectric media, but also a periodic slot array (or its electro magnetic dual, an infinite yagi antenna) in a uniform medium, can support a radiating (or leaky) mode.

AD-608 322 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Microwave Associates, Inc., Burlington, Mass.
HIGH POWER SEMICONDUCTOR PHASE SHIFTING DEVICES, RELIABILITY TEST REPORT.
Final special progress rept. for 1 Jul-30 Sep 64,
by William W. Slavinsky, Jr. Nov 64, 62p
Contract NObsr87291, Proj. SR008 03 02,
Task 9637

Unclassified report

See also AD-603 162.

Descriptors: (*Semiconductor devices, Phase shifters), (*Phase shifters, Antennas), (*Phased arrays, Semiconductor devices), Microwave equipment, Electronic switches, Diodes (Semiconductor), Life expectancy, Reliability (Electronics), Electrical properties, Tests, Experimental data, Graphics.

The use of high power semiconductor devices for phase shifting in array antennas is being considered. The large number of these components in an operational system makes reliability data important. Progress made within the last study interval is reported. This includes the continuation of the life tests through the two thousand hour readings. Data reduction shows that the leakage current has a decreasing failure rate with time; early leakage failures should be screened out by a properly designed burn-in; alternate forward and reverse bias is a more severe test than continuous reverse bias and capacitance variations decrease as frequency increases. (Author)

AD-608 326 Div. 8, 7
OTS Prices: HC $4.00/MF $0.75

Laboratory for Electroscience Research, New York Univ., N. Y.

ANALYSIS OF DRIFT TRANSISTOR CURRENT GAIN WITH APPLICATION TO DISTRIBUTED RC NETWORKS.
Scientific rept. no. 12,
by John J. Kelly. July 64, 106p NYU-TR-400-98
Contract AF19 628 379, Proj. 5628, Task 562806
AFCRL 64 766

Unclassified report

Supported in part by RCA Labs. Div., Radio Corp. of America, Princeton, N. J., under a David Sarnoff RCA Fellowship.
See also AD-601 988.

Descriptors: (*Transistors, Gain), (*Electrical networks, Mathematical analysis), Networks, Resistance (Electrical), Capacitance, Circuits, Diffusion, Transients, Electric currents, Transcendental functions, Electrical engineering.

The common-emitter short-circuit current gain of the intrinsic graded base transistor is analyzed using the Factor Theorem of Weierstrass. The Factor Theorem permits the description of the gain function in terms of its low frequency value, i.e., the d-c current gain and the poles and zeros of the function. The analysis of this report has a two-fold purpose. The primary purpose is to show the applicability of the Factor Theorem to the analysis of network functions typical of those encountered in integrated circuit structures. For this purpose the gain functions of drift transistors have been analyzed in detail and their similarities to passive distributed RC network functions are noted. The second purpose of the research is to develop techniques for determining the steady-state and transient response of distributed active (or passive) networks in a simple manner without resorting to computers. For the calculation of these quantities the concept of an effective dominant pole and an excess phase factor is shown to be extremely useful. The effective dominant pole and the excess phase factor are derived directly in a systematic manner from the product expansion form. (Author)

AD-608 336 Div. 8
OTS Prices: HC $6.00/MF $1.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
TABLES FOR CURTAIN ARRAYS.
Scientific rept. no. 4 (Series 3),
by Ronold W. P. King, Barbara H. Sandler, and Sheldon S. Sandler. 20 May 64, 278p
Contract AF19 628 2406, Proj. 5635, Task 563502
AFCRL 64 674 Unclassified report
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-274 377.

Descriptors: (*Antennas, Tables), Electrical impedance, Admittance, Antenna radiation patterns, Electromagnetic waves, Radio waves.

The general King-Sandler array theory has been examined in detail for endfire and broadside arrays of up to 35 elements with half-and full-wavelength spacings. Tables of individual admittances, impedances, element currents, and H-plane radiation patterns are presented for endfire and broadside arrays first with driving-point currents specified and then with driving-point voltages specified. (Author). Attached are reprints of the articles by King and S. S. Sandler from the 'IEEE Transactions on Antennas and Propagation,' vol. AP-12, no. 3, May 1964: The theory of broadside arrays, p. 269-275, and the theory of endfire arrays, p. 276-280.

AD-608 361 Div. 8
OTS Prices: HC $4.00/MF $1.00

Hughes Aircraft Co., Fullerton, Calif.

IMPROVED DELAY LINE TECHNIQUES.
Final rept.,
by Lisle M. Sanborn. Oct 64, 134p HAC-FR-64-15-59
Contract AF30 602 2987, Proj. 4506, Task 450601
RADC TDR64 356

Unclassified report

Descriptors: (*Delay lines, Ultrahigh frequency), Transmission lines, Ultrasonic radiation, Radar, Bandwidth, Frequency, Nonlinear systems, Transducers, Coupling circuits, Performance (Engineering), Test equipment (Electronics), Programming (Computers).

Ultrasonic dispersive delay lines were investigated as to their operating characteristics in the ultra high frequency region. A breadboard line was constructed and tested. A computer study was also undertaken to investigate the feasibility of higher mode operation in dispersive delay lines. (Author)

AD-608 362 Div. 8
OTS Prices: HC $3.00/MF $0.75

General Telephone and Electronics Labs., Inc.,
Bayside, N. Y.
STUDY OF FAILURE MECHANISMS IN HIGH-POWER RADIO-FREQUENCY-GENERATING DEVICES.
Final rept. for 30 Apr 63-29 Apr 64,
by M. Friedman Axler and R. A. Hein. Sep 64, 98p
GTEL-TR64-256.12
Contract AF30 602 3018, Proj. 5519, Task 551902
RADC TDR64 290

Unclassified report

Descriptors: (*Radiofrequency generators, Reliability (Electronics)), (*Traveling-wave tubes, Reliability (Electronics)), Gases, Nitrogen, Hydrogen, Carbon compounds, Monoxides, Cathodes (Electron tubes), Oxides, Heating elements, Anodes (Electron tubes), Electron guns, Gas analysis, Mass spectroscopy, Microwave equipment.

Electrical test parameters of the traveling-wave tube and their relation to the gas ambient are presented. For tubes incorporating oxide-coated cathodes, decreases in cathode activity are correlated with integrated total and partial pressures in the operating tube. Contributions made by various processed tube components and subassemblies to the gas ambient of the operating vacuum tube are described. The most significant gas sources are the alumina-coated tungsten heater coil as a source of N2 and the kovar or molybdenum anode and plated-tungsten grid, as sources of H2, CO, and hydrogenous gases when plate current is drawn. A hydrogen-firing technique for reducing evolved gases is described. (Author)

AD-608 363 Div. 8
OTS Prices: HC $2.00/MF $0.50

Technical Research Group, East Boston, Mass.
WIDE-ANGLE PROPERTIES OF DUAL-REFLECTOR ANTENNAS-EXPERIMENTAL.
Final rept.,
by Alan J. Simmons and Thomas C. Cahill. Sep 64, 38p
Contract AF30 602 3170, Proj. 4506, Task 450604
RADC TDR64 286

Unclassified report

Descriptors: (*Parabolic antennas, Antenna radiation patterns), (*Reflectors, Antennas), X band, Beamwidth, Antenna feeds, Antenna lobes, Gain, Scanning, Antenna configurations, Polarization, Reflectors, Design.

Two dual-reflector Cassegrain microwave systems were studied experimentally and theoretically for wide-angle performance at 9000 mc. The parabolic reflector diameter was 72 inches and the hyperbolic subdish diameter 14.4 inches in Case 1 (d/D = 0.2) and 21.6 inches in Case 2 (d/D = 0.3). In Case 1, a scan of 4 beamwidths off-axis was achieved with 3db drop in gain, in Case 2, 5 beamwidths. Sidelobe level on-axis for Case 1 was about 18db, for Case 2 about 14db. Scanning performance was in good agreement with theory. (Author)

AD-608 365 Div. 8
OTS Prices: HC $6.00/MF $1.25

IIT Research Inst., Chicago, Ill.
STUDY OF COMPREHENSIVE FAILURE THEORY.
Final rept. for 27 May 63-27 Feb 64,
by M. E. Goldberg, A. Horberg, H. A. Lauffenburger, D. W. Levinson, and R. G. Stewart. Sep 64, 252p
IITRI-E6006-11
Contract AF30 602 3054, Proj. 5519, Task 551902
RADC TDR64 309

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Resistors, Reliability (Electronics)), (*Reliability (Electonics), Mathematical prediction), (*Semiconductor devices, Failure (Mechanics)), Mathematical models, Oxidation, Degradation, Aging (Materials), Metal films, Diodes (Semiconductors).

Precipitation and oxidation are described as two principal failure mechanisms occurring in deposited metal film resistors. Resistors aged in the absence of oxygen show the behavior expected of the precipitation process; reduction of resistance with time. Evidence of clustering is also obtained. Resistors exposed to oxygen at high temperature show the anticipated increase in resistance with time. Experiments performed with quartz crystals show a fourth power relationship for the oxidation kinetics. A mathematical model of resistor behavior, involving at this time oxidation and precipitation, has been investigated and programmed for the IBM 7090 computer. The resulting computations to date agree poorly with available resistor test data. This is attributed to (1) effects and mechanisms which have not yet been incorporated in the model, and (2) the data available for validation studies represent mean value data for hundreds of resistors. Study of a semiconductor device has been initiated. A silicon planar epitaxial diode has been selected as the device to model. Studies of failure mechanisms point to ionic contaminant migration as the probable first order failure mechanism affecting performance in this device.

AD-608 371 Div. 8, 26
OTS Prices: HC $4.00/MF $1.00

TRW Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE. RELIABILITY THRU PROCESS IMPROVEMENT (2N1506).
Final rept. vol. 1, 25 Jun 62-17 Apr 64,
by R. Austin, G. Kamienski, and P. Kellow. 17 Apr 64, 142p TRWS-3000-43, vol. 1
Contract DA36 039SC86742

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-608 372.

Descriptors: (*Transistors, Manufacturing methods), (*Reliability (Electronics), Transistors), (*Quality control, Transistors), Tests, Life expectancy,

Silicon, High frequency, Diffusion, Single crystals, Failure (Mechanics), Production, Processing, Bonding, Gold, Aluminum, Welding.

Basic process improvements have been incorporated into the production of the 2N1506A, PT531, PT613 families in the specified areas of material evaluation, impurity diffusion, contact metallizing, contact lead attachment, collector attachment, final preparation prior to sealing and cap welding. The result of these improvements has been the attainment of the purpose of the contract for a maximum failure rate of .01%/1000 hours in operating life at 25C at a 90% confidence level. (Author)

AD-608 372 Div. 8, 26
OTS Prices: HC $5.00/MF $1.00

TRW Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE. RELIABILITY THRU PROCESS IMPROVEMENT (2N1506).
Final rept., vol. 2, 25 Jun 62-17 Apr 64,
by R. Austin, G. Kamienski, and P. Kellow. 17 Apr 64, 162p TRWS-3000-43, vol. 2
Contract DA36 039SC86742

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-608 371, AD-608 373.

Descriptors: (*Transistors, Manufacturing methods), (*Reliability (Electronics), Transistors), (*Quality control, Transistors), Specifications, Test methods, Production, Packaging, Life expectancy, Silicon, High frequency.

The specification was prepared in conformance with the requirements of the contract and is in accordance with the 2N1506A specification MIL-S-19500/265(EL) except for the reliability level. The Quality Control Manual is presented under which all work for this contract was performed.

AD-608 373 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

TRW Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE. RELIABILITY THRU PROCESS IMPROVEMENT (2N1506).
Final rept. vol. 3, 25 Jun 62-17 Apr 64,
by R. Austin, G. Kamienski, and P. Kellow.
17 Apr 64, 88p TRWS-3000-43, vol. 3
Contract DA36 039SC86742

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-608 372.

Descriptors: (*Transistors, Manufacturing methods), (*Reliability (Electronics), Transistors), (*Quality control, Transistors), Processing, Specifications, Production, Silicon, High frequency, Diffusion, Chemical milling, Aluminum, Bonding, Welding.

Process specifications are presented for the production of the 2N1506 transistor.

AD-608 387 Div. 8 6
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
TOPICS IN SIGNAL ESTIMATION,
by P. Swerling. Oct 64, 72p P-3007

Unclassified report

Descriptors: (*Signals, Mathematical prediction), (*Signal-to-noise ratio, Communication theory), Stochastic processes, Least squares method, Recursive functions, Radar signals.

The topics presented on signal estimation include (1) generalized least squares estimates (2) the linear case with an infinite set of parameters (3) recursive solutions of signal estimation problems and (4) areas of future research.

AD-608 401 Div. 8, 26
OTS Prices: HC $6.00/MF $1.25

General Electric Co., Owensboro, Ky.
7486 CERAMIC TRIODE, PRODUCTION ENGINEERING MEASURE.
Final rept. for 19 Jun 62-19 May 64,
by J. D. Marshall. 19 Jun 64, 208p
Contract DA36 039SC86738

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Triodes, Manufacturing methods), Ceramic materials, Life expectancy, Tests, Test equipment, Vacuum seals, Specifications, Electron tube parts, Coatings, Performance (Engineering), Electron tube heaters, Tungsten alloys, Rhenium alloys, Quality control, Vacuum pumps, Production.

A summary of progress during the program is given with graphs and illustrations. The capability for producing 100 good tubes type 7486 per 8 hour day was demonstrated. Preproduction and production test reports are included. A copy of the improved test specification is presented. (Author)

AD-608 413 Div. 8
OTS Prices: HC $1.00/MF $0.50

Microwave Electronics Corp., Palo Alto, Calif.
A THREE-WATT LOW-NOISE TRAVELING-WAVE TUBE FOR C-BAND.
Interim development rept. no. 1, 1 Jul-30 Sep 64.
Oct 64, 16p
Contract NObsr91322, SFO 100201, Task 9294

Unclassified report

Descriptors: (*Traveling-wave tubes, C band), Design, Noise, Microwaves, Magnetrons, Voltage, Radio-frequency, Helixes.

Work during this quarter was devoted mainly to design calculations for the entire vacuum envelope-focusing system. Critical long lead time items were ordered and first experiments with a new and improved technique for helix fabrication, expected to improve over-all tube efficiency, were performed. (Author)

AD-608 456 Div. 8, 14, 25
OTS Prices: HC $3.00/MF $0.75

Shockley Transistor Div., Clevite Transistor, Palo Alto, Calif.
FAILURE MECHANISMS IN SILICON SEMICONDUCTORS.
Quarterly status technical documentary rept. no. 5,
1 Mar-1 Jun 64,

by Walter Schroen and William W. Hooper.
Oct 64, 78p
Contract AF30 602 3016, Proj. 5519, Task 551906
RADC TDR64 361

Unclassified report

Descriptors: (*Transistors, Failure (Mechanics)), (*Reliability (Electronics), Transistors), Failure (Mechanics), Silicon, Semiconductor devices, Oxides, Coatings, Ions, Motion, Protective treatment, Electrical-conductance, Electric fields, Surface properties, Mathematical analysis, Thermal properties, Stability, Wiring diagrams, Electric currents.

This report is divided into two main sections, both dealing with failure mechanisms in silicon semiconductors. The first part treats investigations of surface phenomena in oxide-protected silicon devices. The problem of ion motion on oxide layers is studied in considerable detail. The conductivity of oxide layers was measured over extended periods of time. Relaxation effects were observed which are attributed to the motion of ions on the oxide surface under the influence of an electric field. The second part of this report deals with further investigations of 'second breakdown' in silicon power transistors. Transistors were studied which had localized thin spots intentionally introduced into the structure. In all cases, hot spots were formed to occur at the thin spots. Burn out due to second breakdown, however, did not occur in all cases at the thin spots. Preparation was begun on simplified transistor structures to better study the manner in which hot spots and second breakdown occur, and the role which the base resistance plays in the second breakdown problem. (Author)

AD-608 462 Div. 8, 6
OTS Prices: HC $7.20/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROBLEMS OF THE STATISTICAL THEORY OF RADAR,
by P. A. Bakut, I. A. Bol'shakov, B. M. Gerasimov, A. A. Kuriksha, and V. G. Repin. 19 Oct 64, 421p
FTD MT64 113; TT 65 60127

Unclassified report

Edited machine trans. of mono. Voprosy Statisticheskoi Teorii Radiolokatsii, v. 1, Moscow, 1963, 424p.

Descriptors: (*Radar, Theory), Detection, Radar signals, Radar interference, Modulation, Radar jamming, Radar receivers, Target recognition, Target discrimination, Radar scanning, Signal-to-noise ratio, Optimization, Statistical functions, Probability.

This book is a monograph on the statistical theory of radar. It consists of two volumes. In the first volume the basic problems of the theory of detection are expounded, in the second--the problems of radar measurements and several problems on target resolution. Methods for analysis and synthesis of radar systems are treated, as are many results and rules obtained by these methods. The book is designed for teachers and those acquainted with the basic aspects of the theories of probability and the theories of random processes. The necessary information from the theory of statistical resolution is given in the book. The book is intended for scientific workers and engineers, those concerned with radar problems, and also for post-graduate students and students of corresponding specialities. (Author)

AD-608 465 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Clevite Corp., Bedford, Ohio.
PRODUCTION ENGINEERING MEASURE FOR CERAMIC FILTERS.
Quarterly progress rept. no. 6, 30 Jun-29 Sep 64,
by A. Lungo. 29 Sep 64, 17p
Contract DA36 039AMC01471E

Unclassified report

Descriptors: (*Ceramic materials, Filters (Electromagnetic wave)), (*Filters (Electromagnetic wave), Ceramic materials), Disks, Manufacturing methods, Machining, Tuning devices, Resonators, High frequency, Electrodes, Resonance, Polarization, Packaging.

Problems encountered in pressing 1.75 Mc radially resonant disks having raised centers for electrical contact and mechanical support are discussed. The solutions to these problems are also discussed. Difficulties that developed in applying the new electroding technique to thin ceramic disks are discussed. The solution to these difficulties are included in the discussion. A new tumble grinding technique is presented which appears to meet the requirement for a low cost ceramic disk tuning method. (Author)

AD-608 473 Div. 8, 14, 26
OTS Prices: HC $6.00/MF $1.50

Aeronca Mfg. Corp., Middleton, Ohio.
INVESTIGATION OF FOAM PLASTIC TECHNIQUES FOR HARDENING GROUND RADOMES.
Final rept. for 1 Jul 63-31 May 64,
by B. B. Cahill. Oct 64, 288p
Contract AF30 602 3128, Proj. 5579, Task 557901
RADC TDR64 363

Unclassified report

Descriptors: (*Radomes, Expanded plastics), (*Expanded plastics, Radomes), Shelters, Nuclear explosion damage, Polyethylene plastics, Laminated plastics, Radiation damage, Thermal radiation, Degradation, Hardness, Ablation, Structures, Mathematical analysis, Encapsulation, Structural shells, Electrical properties, Polymers, Mechanical properties, Stresses, Loading (Mechanics), Epoxy plastics, Styrene plastics, Bonding, Antenna radiation patterns, Model tests.

The investigation reported here was directed toward the determination of the feasibility of hardening above ground antenna installations, at the 75 psi free-field overpressure range for a one megaton nuclear burst, by means of psuedo-encapsulation with a foam plastic radome. Conclusions from the investigation of the effects of a nuclear detonation on the selected foam plastics are summarized as follows: (1) The nuclear radiation will have a negligible effect on the dielectric and mechanical properties. (2) Thermal radiation produces considerable physical changes in all foam plastic materials through ablation, burning and melting. The electrical properties of most foam plastics are affected as a result of charred composites on the residual surface. However, polyethylene foam was observed in thermal ablation tests to leave no charry residue. A thermal protection system using a polyehtylene foam laminate was concluded feasible. (3) Mechanical shock effects due to the blast overpressure wave were inconclusive due to inadequate test data on the stress-strain response of foams to dynamic loading. Conditional feasibility can be assumed on the basis of anticipated foam plastic nonlinear viscoelastic response.

AD-608 475 Div. 8
OTS Prices: HC $2.00/MF $0.50

Scientific-Atlanta, Inc., Atlanta, Ga.
PRECISION ANTENNA PATTERN RECORDING TECHNIQUES, PHASE II.
Rept. for 1 Jun-28 Aug 64,
by Jack B. Chastain, J. Searcy Hollis, Samuel F. Hutchins, and Rezin E. Pidgeon, Jr. Oct 64, 24p
Contract AF30 602 3425, Proj. 4506, Task 450604
RADC TDR64 420

Unclassified report

See also AD-415 912.

Descriptors: (*Antenna radiation patterns, Measurement), (*Electronic recording systems, Antenna radiation patterns), Frequency stabilizers, Display systems, Digital-to-analog converters, Measuring devices (Electrical and electronic).

This work is a continuation of work on a study and an investigation made to prove the feasibility of precision amplitude - and angle - measuring devices, combined with sophisticated recording and display techniques, for antenna pattern measurements. The current program includes development of a stabilized transmitter, a precision, high data rate receiver and associated equipment.

9. Fluid Mechanics

AD-607 993 Div. 9, 4, 10
OTS Prices: HC $1.00/MF $0.50

John Hopkins Univ., Baltimore, Md.
CHEMICAL REACTIONS IN HOMOGENEOUS TURBULENT FIELDS,
by S. Corrsin. 1964, 13p
Unclassified report

Supported by Fluid Dynamic Branch, U. S. Office of Naval Research.
Presented at A.I.A.A. Meeting, New York, 20 January 1964.

Descriptors: (*Turbulence, Chemical reactions), (*Fluid flow, Chemical reactions), Jet mixing flow, Impurities, Combustion, Thermochemistry, Mathematical models, Differential equations, Integral transforms.

Supposing that the homogeneous turbulent mixing of a passive, scalar contaminant is statistically known, it would be desirable to learn what differences will result from incorporating chemical reactions. The long range goal is turbulent combustion, in which the large (random) heat release probably feeds back into the fluid dynamics. The paper touches upon two classes of problems: (1) estimates of decay rates of average concentrations and isotropic concentration fluctuations, (2) estimates of the forms of Fourier 'power spectra' for locally isotropic, statistically stationary fields. Three idealized, irreversible, passive, chemical reaction types are mentioned: (a) first-order, isothermal, (b) second-order, isothermal, (c) first order, slightly exothermic. The spectral estimates employ a generalization of Onsager's turbulence cascade theory. (Author)

AD-608 013 Div. 9, 12, 27
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
VARIATIONAL SOLUTION OF FUEL SLOSHING MODES,
by H.R. Lawrence, C. J. Wang, and R. B. Reddy.
1 Dec 57, 40p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fuel tanks, Sloshing), (*Sloshing, Mathematical analysis), Fuels, Motion, Fluid flow, Axially symmetric flow, Tanks (Containers), Geometric forms, Analysis of variance, Liquid rocket propellants.

The problem of calculating the motion of an incompressible inviscid fluid with a free surface is formulated as a variational principle. The result is in the form of an expansion in powers of the wave height. The theory is specialized to the linear case where it is demonstrated that the variational principle is of the free boundary condition type. A procedure for calculating the natural frequencies and modes of the shallow and the deep tank by applying the Rayleigh-Ritz procedure to solution of the variational formulation is discussed. An approximate procedure for calculating the sloshing modes and frequencies of a tank of intermediate depth in terms of the solutions for shallow and deep tanks is suggested. The results of numerical calculations for conical tank are presented in the form of mode shape diagrams and frequency charts. (Author)

AD-608 023 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
A SOLUTION OF THE BOUNDARY LAYER EQUATIONS IN THE STAGNATION REGION OF A BLUNT NOSE BODY OF REVOLUTION,
by Robert Bromberg. 11 Apr 55, 11p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Heat transfer, Boundary layer), (*Stagnation point, Heat transfer), Bodies of revolution, Blunt bodies, Gas flow, Iterative methods, Equations.

A knowledge of the rate of heat transfer from a flowing gas to the stagnation region of a body of revolution is of considerable interest in many applications. Solutions are presented for a range of conditions, including that of large heat transfer in an imperfect gas.

AD-608 024 Div. 9, 12, 25
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
MAGNETOHYDRODYNAMICS AND AERODYNAMIC HEATING,
by Rudolf X. Meyer. 1958, 30p
Unclassified report

Descriptors: (*Magnetohydrodynamics, Aerodynamic heating), (*Hypersonic flight, Magnetohydrodynamics), (*Aerodynamic heating, Magnetohydrodynamics), Hypersonic flow, Stagnation point, Heat transfer coefficients, Magnetic fields, Ionization, Electric discharges, Plasma physics, Air, Body of revolution, Heat transfer.

The basic equations and some fundamental concepts of magnetoaerodynamics are discussed. As an application, the problem of the flow near the stagnation point of a body of revolution is reviewed and an exact solution is given. Data are presented for the heat transfer coefficient at the stagnation point, and for its gradient in the stagnation point region. The magnetic field strength required to accomplish an appreciable reduction of aerodynamic heating in hypersonic flight is discussed, for the case in which ionization is due to thermal motion. Alternatively, methods which involve electrical breakdown of the air are considered. (Author)

AD-608 040 Div. 9, 12
OTS Prices: HC $3.00/MF $0.75

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE AND HEAT TRANSFER MEASUREMENTS AT MACH 13 AND 19 FOR FLOWS AHEAD OF RAMPS, OVER EXPANSION CORNERS, AND PAST FIN-PLATE COMBINATIONS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Stavros A. Hartofilis. Sep 64, 57p
Contract AF33 616 8130, Proj. 8219, Task 821902
FDL TDR64 144
Unclassified report

Descriptors: (*Aerodynamic control surfaces, Hypersonic flow), (*Hypersonic flow, Aerodynamic control surfaces), (*Heat transfer, Aerodynamic control surfaces), Flat plate models, Reentry vehicles, Aerodynamic characteristics, Aerodynamic heating, Flaps, Trailing control surfaces, Reynolds number,

Angle of attack, Model tests, Fins, Hypersonic wind tunnels, Pressure, Separation.

This report presents heat transfer and pressure distributions for hypersonic flows ahead of ramps, over expansion corners, and past fin-plate combinations. Two basic models were used for these experiments: 1) a flat plate with a full span ramp (trailing-edge flap) on one surface and an expansion corner on the other, and 2) a flat plate with wedge shaped fins mounted on the upper surface and an expansion corner on the lower surface. Both sharp leading edge models were tested in the Grumman Hypersonic Shock Tunnel at Mach 13 and 19. The plate-flap model was tested at angle of attack = -15 to +30 degrees, with flap deflections from 0 to 45 degrees, at Reynolds numbers per foot of 0.8 x 100000 to 1.4 x 100000 at Mach 19 and of 1.2 x 100000 at Mach 13. The fin-plate model was tested at angle of attack = 0 only, with 15 degree wedge shaped fins having two different heights at a Reynolds number per foot of 2.4 x 100000 at Mach 13 and of 0.8 x 100000 at Mach 19. (Author)

AD-608 070 Div. 9
OTS Prices: HC $2.00/MF $0.50

Air Force Flight Dynamics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
AERODYNAMIC HEATING SIMULATION. PART I. THEORY AND PROGRAM DEFINITION,
Sep 64, 42p
Proj. 1347, Task 134703
FDL TDR64 112 P1

Unclassified report

Descriptors: (*Aerodynamic heating, Simulation), Theory, Heat transfer, Atmosphere entry, Nose cones, Thermal radiation, Digital computers, Programming (Computers), Control, Flight.

The study was conducted to determine how accurately aerodynamic heating is simulated in the laboratory with radiant heat lamps under computer control. A study of aerodynamic heating theory resulted in the preparation of a digital computer program for calculating the parameters required as input data for the heat rate computer. The heat rate computer is used to control the heat input to an actual flight test specimen. Laboratory test results are compared with flight measured data to determine the degree of simulation. Test results indicate that aerodynamic heating may be adequately simulated up to 600F. Laboratory simulation to higher temperatures is being studied for future programs. (Author)

AD-608 090 Div. 9, 27
OTS Prices: HC $9.45/MF $2.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TECHNICAL GAS DYNAMICS,
by M. E. Deich. 31 Aug 64, 648p
FTD MT63 197; TT 64 71683

Unclassified report

Edited machine trans. of mono. Tekhnicheskaya Gazodinamika, 2d ed., Moscow/Leningrad, 1961, 671p.

Descriptors: (*Gas flow, Textbooks), USSR, Fluid flow, Entropy, Shock waves, Dynamics, Drag, Boundary layer, Nozzles, Laval nozzles, Supersonic nozzles, Diffusers, Hypersonic diffusers, Supersonic diffusers, Turbines, Gas turbines, Turbine blades.

Contents:
Fundamental concepts and equations of gas dynamics; one-dimensional motion of gas; two-dimensional motion of gas with constant entropy; compression shocks; motion of gas during presence of friction; outflow of gas from narrowing nozzles and apertures: the laval nozzle; movement of gas in diffusers: stage of ejector; flow of gas through turbomachine cascades; flow of gas in a turbomachine stage; methods of experimental investigation of gas flows and blading of turbomachines.

AD-608 094 Div. 9
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Schenectady, N. Y.
STUDY OF THE SURFACE FILMS OF GAS NUCLEI (AS RELATED TO CAVITATION AND TENSILE STRENGTH IN WATER),
by L. H. Bernd. Sep 64, 58p R64GL143
Contract Nonr4296 00, Proj. S R009 01 01

Unclassified report

Descriptors: (*Films, Bubbles), (*Bubbles, Surface tension), (*Cavitation, Bubbles), Diffusion, Gases, Nuclei, Water, Tensile properties, Water tunnels, Fluid dynamic properties.

The formation of surface films about gas nuclei in water has been investigated. The absence -- or existence -- of surface films determines whether water will or will not acquire tensile strength. Various waters have been measured on this ability to acquire tensile strength. Surface films have been manipulated to make water weak or to produce tensile strength. These effects are of fundamental importance to cavitation, and should help explain the occurrence of tensile strength in water tunnels. (Author)

AD-608 096 Div. 9
OTS Prices: HC $5.00/MF $1.00

Oceanics, Inc., Plainview, N. Y.
ON THE HYDRODYNAMIC STABILITY THEORY OF PLANE AND AXISYMMETRIC PARALLEL FLOWS,
by H. Schade. Oct 64, 190p Oceanics-64-18
Contract Nonr4432 00
TT 64 71677

Unclassified report

Zur Hydrodynamischen Stabilitatstheorie Ebener und Axialsymmetrischer Parallelstromungen, trans. of Deutsche Versuchsanst alt fur Luftfahrt, e. V. Berichte (West Germany) 1962, no. 190, 154p. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fluid flow, Fluid dynamic properties), (*Axially symmetric flow, Stability), Turbulence, Theory, Couette flow, Linear systems, Differential equations, Mathematical analysis, Three-dimensional flow, West Germany.

The subject of the paper is to determine how the linearized stability theory for plane parallel flows can be applied to axisymmetric parallel flows. In the first part a compact presentation of the Tollmien-Schlichting-Linschen theory for plane parallel flows is given. The second part treats the stability of axisymmetric parallel flows, first for general three-dimensional disturbances, and then in detail for axisymmetric disturbances. The appendix contains an extensive survey on the history of stability theory for parallel flows. (Author)

AD-608 129 Div. 9
OTS Prices: HC $3.00/MF $0.75

Polytechnic Inst. of Brooklyn, N. Y.

EXPERIMENTAL PRESSURE, TEMPERATURE AND STRAIN MEASUREMENTS ON STAINLESS STEEL THICK-WALLED TUBES WITH INTERNAL AIRFLOW AT HIGH TEMPERATURE AND PRESSURE,
by S. V. Nardo, Burton Erickson, Lawrence D. Brown, David J. Gerada, and Joseph Kempner. Aug 64, 79p
PIBAL-675
Contract Nonr839 23, Proj. NR064 433
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Stainless steel, Pipes), (*Pipes, Fluid dynamic properties), Gas flow, Subsonic flow, High-temperature research, High-pressure research, Strain (Mechanics), Hypersonic wind tunnels, Thickness, Experimental data, Glass textiles, Nylon, Stagnation point, Pressure, Temperature, Loading (Mechanics).

Experimental results of pressure, temperature, and strain measurements made on a series of five Type 304 stainless steel thick-walled tubes are presented in this report. The tubes were subjected to a high-temperature, high-pressure internal airflow at subsonic speeds by utilizing the Mach 4.4 hypersonic wind tunnel facility. All models were approximately 20 inches long with an internal diameter of 2.25 inches; wall thickness ranged from 0.482 to 1.0 inch. Average values of the stagnation pressures and temperatures varied from 60 to 450 psia, and 1400R to 2100R, respectively. Most of the data are presented in graphical form. In a subsequent PIBAL Report, these data will be used (1) to study heat transfer to the heated inner wall of the tubes, (2) to compare the predicted temperature distribution with actual measurements, and (3) to compare experimental strain data with calculations based on both constant and temperature-dependent physical properties of stainless steel. (Author)

AD-608 134 Div. 9, 25
OTS Prices: HC $2.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
THE BASE FLOW PROBLEM AT VERY LOW REYNOLDS NUMBER IN THE OSEEN APPROXIMATION,
H. Viviand and S. A. Berger. Sep 64, 46p
AS-64-15
Contract Nonr222 45
Unclassified report

Descriptors: (*Base flow, Moment of inertia), (*Moment of inertia, Base flow), (*Numerical analysis, Two-dimensional flow), Axially symmetric flow, Reynolds number, Pressure, Velocity, Fluid mechanics, Motion, Equations, Partial differential equations, Gas flow.

The influence of inertia terms in the equations of motion on the properties of the base flow and near wake flow at very low Reynolds numbers was investigated by using Oseen's approximation and by comparing with previous results obtained by the same authors for Stokes flow. The general solutions of Oseen's equations of motion were derived for two-dimensional and axisymmetric flows in the half-space x>0, for an arbitrarily given velocity field in the plane x=0. Numerical examples were given for two-dimensional flow and compared with Stokes flow examples. (Author)

AD-608 161 Div. 9, 27
OTS Prices: HC $3.00/MF $0.50

Gas Turbine Lab., Mass. Inst. of Tech., Cambridge.
CONDENSATION OF CARBON DIOXIDE IN SUPERSONIC NOZZLES,
by Karl M. Duff. Sep 64, 54p GTL-MIT-76
Contract Nonr3963 07
Unclassified report

Descriptors: (*Carbon dioxide, Condensation), (*Supersonic nozzles, Condensation), (*Space propulsion, Condensation), Gas flow, Nucleation, Interferometers, Stagnation point.

Test results indicate a definite region of supersaturation of CO2 prior to its expansion. In Curve I, using assumed isentropic temperatures based on measured pressure ratio, the supersaturation ratio (ratio of static pressure to flat-surface equilibrium pressure at local temperature) obtains an estimated value of 9.14, prior to condensation occurring. In Curve 3, the supersaturation ratio reaches a value of 10.5 prior to condensation and in Curves 4, 5 and 7 values of 11.6, 13.4 and 16.8, respectively. The fact that supersaturation ratios steadily increase prior to the occurence of rapid condensation tends to support the predicitions of nucleation theory that, for CO2, the lines of constant nucleation rate diverge with decreasing pressure and temperatures and that nucleation rates have a critical value of the ratio between the static and stagnation pressures beyond which they rise astronomically, creating a narrow zone where the large portion of condensation occurs. It is further concluded that the interferometer does not lend itself to the convenient procurement of accurate density and pressure profiles in this particular nozzle under these extreme temperature conditions.

AD-608 170 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

Gas Dynamics Lab., Northwestern Univ., Evanston, Ill.
GENERALIZED SELF-SIMILARITY AND SOLUTIONS FOR MAGNETOGASDYNAMIC FREE JETS.
Thesis,
by William F. Hug. 1964, 80p NU-GDL-B-3-64
Grants AF AFOSR62 307, AF AFOSR63 329
Unclassified report

Descriptors: (*Jets, Magnetohydrodynamics), (*Jet mixing flow, Mathematical analysis), Laminar flow, Two-dimensional flow, Subsonic flow, Differential equations, Magnetic fields, Incompressible flow, Mathematical models.

The method of self-similar solutions has been shown to be a powerful analytical tool in the investigation of the mixing region of a laminar two-dimensional magneto-gasdynamic jet which is freely expanding into an unbounded stagnant region. The general conditions under which self-similitude can be expected are investigated. Two undocumented solutions are shown to be available: (1) The subsonic gasdynamic free jet with non-unitary Prandtl number and a viscosity which is proportional to the square root of temperature. Solution to this problem is given in closed form in the 'incompressible' von Mises solution plane with a transformation back to physical coordinates accomplished by numerical integration. (2) The subsonic magneto-gasdynamic free jet with non-unitary Prandtl number, a viscosity which is proportional to the square root of temperature, and an electrical conductivity which is proportional to the square root of the temperature cubed. (Author)

AD-608 208 Div. 9
OTS Prices: HC $2.00/MF $0.50

Gas Dynamics Lab., Princeton Univ., N. J.

LAMINAR SEPARATED FLOW WITHIN REJOINING OR REATTACHING BOUNDARY LAYERS,
by Sin-I Cheng. Jul 64, 44p AER-701
Contract AF49 638 1271
AFOSR 64 1596

Unclassified report

Descriptors: (*Jet mixing flow, Stagnation point), (*Laminar flow, Separation), (*Fluid mechanics, Numerical analysis), Partial differential equations, Wake, Boundary layer, Supersonic characteristics, Pressure, Model theory, Differential geometry.

The separated flow next to where the supersonic boundary layers rejoin or reattach was studied with the Navier-Stokes equations a round the stagnation point, enclosed between the boundary layers. For the separated, recirculatory flow to be dynamically possible, it was found that at the rear stagnation point the rejoining wake flow must possess: (i) a parabolic dividing streamline (D.S.L.), (ii) a proper axial pressure gradient, and (iii) an outer inviscid stream parallel to the axis of symmetry of the recirculatory flow. Likewise, at the reattachment point, the recirculatory flow must possess (i) a linear D.S.L., (ii) a positive axial pressure gradient and (iii) a given ratio for the slopes of the inviscid streamline over the reattachment point and of the stagnating D.S.L. A model for the analysis of the recirculatory wake is discussed. In the inviscid limit with no initial boundary layer, the model is similar to Chapman's except for the static pressure at the rejoining point and for the over-compression downstream.

AD-608 294 Div. 9
OTS Prices: HC $2.00/MF $0.50

Cincinnati Univ., Ohio.
A CRITICAL ASSESSMENT OF THE PROBLEM OF SHARP LEADING EDGE OF A FLAT PLATE IN HYPERSONIC FLOW,
by A. C. Jain and T. Y. Li. Jul 64, 42p AE-6401
Contract Nonr2168 03, Proj. NR061 138

Unclassified report

Descriptors: (*Hypersonic flow, Flat plate models), (*Flat plate models, Hypersonic flow), Leading edge flaps, Aerodynamic characteristics, Shock waves, Boundary layer, Viscosity, Mathematical analysis, Heat transfer, Reviews.

The advent of vehicles, moving many times the velocity of sound makes it necessary to understand clearly the various phenomena occuring near the sharp leading edge of a flat plate. A few theoretical attempts to tackle this problem are made and several experiments are performed at various places. Unfortunately wide areas of disagreement exist between the various theoretical investigations and experimental results. It is the purpose of the note to try to gather some useful information from the available literature on this subject and present some suggestions which might be useful or worth consideration in any future attempt of solving this problem. (Author)

AD-608 303 Div. 9
OTS Prices: HC $3.00/MF $0.50

Minnesota Univ., Minneapolis.
DRAG COEFFICIENTS OF SEVERAL BODIES OF REVOLUTION AT TRANSONIC AND SUPERSONIC VELOCITY,
by H. G. Heinrich, Sheldon R. Hess, and Gunar Stumbris. Sep 64, 54p
Contract AF33 616 8310, Proj. 6065, Task 606503
ASD TDR63 663

Unclassified report

Jointly sponsored by the QM Research and Engineering Command, Dept. of the Army; and Bureau of Aeronautics and Bureau of Ordnance, Dept. of the Navy.

Descriptors: (*Drag, Bodies of revolution), (*Bodies of revolution, Deceleration), Transonic flow, Supersonic flow, Atmosphere entry, Aerodynamic loading, Reentry vehicles, Drag parachutes, Wake, Wind tunnels.

The drag coefficients of several bodies of revolution which are significant for the purpose of aerodynamic deceleration were measured in the transonic flow regime and at supersonic speeds of Mach numbers 4 and 5. (Author)

AD-608 304 Div. 9, 12
OTS Prices: HC $5.00/MF $1.00

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
STATIC AERODYNAMIC CHARACTERISTICS AT MACH 5 AND 8 OF AN AERODYNAMICALLY CONTROLLABLE WINGED RE-ENTRY CONFIGURATION; RART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Lawrence Meckler. Sep 63, 160p
Contract AF33 616 8130, Proj. 8219, Task 821902
FDL TDR64 10

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Reentry vehicles, Aerodynamic characteristics), (*Aerostatics, Aerodynamic control surfaces), Delta wings, Aerodynamic configurations, Trailing control surfaces, Flaps, Fins, Spoilers, Angle of attack, Reynolds number, Wind tunnel models, Graphics.

Six-component aerodynamic data were obtained at Mach 5 and 8 for a winged re-entry configuration having aerodynamic controls. The basic model consisted of a clipped delta wing with an over-slung body. The main controls tested were a deflected apex and partial-span trailing-edge flaps. Data were also obtained on the effect of tip fins, full-span trailing-edge flap, and trailing-edge spoiler. At Mach number 5 the data were obtained over an angle of attack range from -30 degrees to +45 degrees at a unit Reynolds number of 2.26 x 10 to the 6th power. At Mach number 8 the angle of attack range was -54 degrees to +54 degrees at the same unit Reynolds number. (Author)

AD-608 310 Div. 9
OTS Prices: HC $3.00/MF $0.75

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
EFFECT OF FLAPS ON THE LIFT AND DRAG OF A SURFACE-PIERCING, FULLY VENTILATED DIHEDRAL HYDROFOIL,
by Geradrd Fridsma. Nov 64, 66p SIT-DL-978
Contract Nonr263 20, Proj. NR062 212, KH2081 016

Unclassified report

Descriptors: (*Hydrofoils, Fluid dynamic properties), (*Lift, Hydrofoils), (*Drag, Hydrofoils), Dihedral angle, Hydrodynamic configurations, Ventilation, Test methods, Water tunnels, Hydrodynamics, Experimental data, Graphics, Photographs.

A surface-piercing, fully ventilated dihedral hydrofoil was tested to evaluate the effects of flaps on the lift and drag characteristics. The 30-degree-dihedral foil was equipped with a number of full-span flaps: two 25-percent-chord flaps deflected 20 degrees and 40 degrees, and two

50-percent flaps deflected 10 degrees and 30 degrees. These configurations were operated over a speed range of 20 to 30 fps, at trim angles of 6 to 16 degrees, and at submergences of 1 to 3 chords. Finite-aspect ratio and free-surface effects were removed from the test data, through the use of techniques developed earlier in this series of studies on cambered and flat-plate hydrofoils. The corrected results thus obtained are compared with a two-dimensional non-linear theory at infinite submergence, and good agreement is obtained. A procedure is described which can be followed to predict the three-dimensional lift and drag, at finite depth, for a surface-piercing, fully ventilated, dihedral hydrofoil with flaps. (Author)

AD-608 323 Div. 9
OTS Prices: HC $3.00/MF $0.75

Boeing Scientific Research Labs., Seattle, Wash.
ON THE HARMONIC OSCILLATION OF A RIGID BODY ON A FREE SURFACE,
by W. D. Kim. Oct 64, 74p D1-82-0378, FSL-91
Unclassified report

Also available from the author.

Descriptors: (*Ellipsoids, Hydrodynamics), (*Hydrodynamics, Ellipsoids), Cylindrical bodies, Floating bodies, Ship models, Incompressible flow, Oscillation, Harmonic analysis, Potential theory, Green's function, Integral equations, Fluid mechanics.

The present paper deals with the practical and rigorous solution of the potential problem associated with the harmonic oscillation of a rigid body on a free surface. The body is assumed to have the form of either an elliptical cylinder or an ellipsoid. The use of Green's function reduces the determination of the potential to the solution of an integral equation. The integral equation is solved numerically and the dependency of the hydrodynamic quantities of the rigid body on the frequency of the oscillation is established. The present results are useful for the solution of the diffraction problem in which the incident wave is prescribed. (Author)

AD-608 405 Div. 9
OTS Prices: HC $1.00/MF $0.50

Institute for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park.
THREE-DIMENSIONAL FLOW IN AXIAL FLOW TURBOMACHINES.
Final rept.
by John R. Weske. 26 Aug 60, 6p
Contract AF49 638 385
AFOSR 211
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also PB 154 714.

Descriptors: (*Three-dimensional flow, Axial-flow turbines), (*Axial-flow turbine, Three-dimensional flow), Shock waves, Enthalpy, Boundary layer, Theory, Wind tunnels, Electric discharges, Test methods, Subsonic flow, Transonic flow, Spark shadowgraph photography, Photographic analysis.

The objective of this research has been the investigation of the nature of three-dimensional motion associated with the interaction between rotating axial flow blade rows and the working fluid, i. e. air, and the quantitative determination of the effect of three-dimensional motion upon the process of energy conversion. The investigation pertained to both the subsonic and the transonic regime of flow in turbomachines. It has been pursued by the theoretical as well as the experimental approach. Theoretical studies have been concerned with the analysis of compression shocks in regions of flow with an upstream total enthalpy gradient and with analogous patterns encountered in the flow relative to the blades of a rotating blade grid. Computations of the flow field behind three-dimensional oblique shocks were carried through parallel to corresponding experimental studies.

AD-608 430 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

Fluid Mechanics Lab., Mass. Inst. of Tech., Cambridge.
SHOCK STRUCTURE IN A PARTIALLY IONIZED GAS,
by Michel Y. Jaffrin. Oct 64, 80p FML-Pub-64-9
Contract Nonr1841 93
Unclassified report

Descriptors: (*Plasma medium, Shock waves), (*Shock waves, Plasma physics), Gas ionization, Hydrogen, Atoms, Electrons, Ions, One-dimensional flow, Thermal conductivity, Electric fields, Transport properties, Boundary layer, Partial differential equations, Atmosphere entry.

The one-dimensional, steady state structure of a shock wave in a partially ionized gas is investigated using the Navier-Stokes equations for the atom, electron, and ion fluids. The plasma is assumed quasi-neutral without a change in ionization across the shock. An experimental measurement in partially ionized hydrogen of the variation of potential in a strong shock gives a shock thickness and a potential rise across the imbedded shock in good agreement with the calculated values.

AD-608 431 Div. 9
OTS Prices: HC $3.00/MF $0.75

Fluid Mechanics Lab., Mass. Inst. of Tech., Cambridge.
RAREFIED FLOW TRANSITION AT A LEADING EDGE,
by Y. S. Pan and Ronald F. Probstein. Oct 64, 92p
FML-Pub-64-8
Contract Nonr1841 93
Unclassified report

Descriptors: (*Airfoils, Hypersonic flow), (*Hypersonic flow, Flat plate models), Superaerodynamics, Shock waves, Mathematical models, Partial differential equations, Numerical analysis, Slender bodies, Heat transfer, Reynolds number, Viscosity, Boundary layer, Density, Wake.

Rarefied flow near the leading edge of a flat plate is studied by using the Navier-Stokes equations as a model. By considering the structure of an oblique shock wave, new low density jump conditions are obtained which include the effects of inviscid curvature, thickness, and transport behind the shock. The latter effect leads to the concept of a 'velocity slip' (and temperature jump) behind a shock, analogous to that prevailing at a solid surface in a low density flow. One of the important results of the numerical calculations is that the local heat transfer rate at low Reynolds number can be greater than the free molecule value with a unit accommodation coefficient. This is shown to be consistent with near free molecule theories and with some experimental data. Correlation formulas for air of the surface heat transfer rate and pressure distribution are presented as a function of Reynolds number, Mach number, and surface temperature. (Author)

AD-608 441 Div. 9, 1
OTS Prices: HC $5.00/MF $1.00

Grumman Aircraft Engineering Corp., Bethpage, N. Y.

PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 8 FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS. PART II: PRESSURE DATA FOR DIHEDRAL SURFACES (PART OF AN INVESTIGATION FOR HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS),
by Louis G. Kaufman II. Sep 64, 180p
Contract AF33 616 8130, Proj. 8219, Task 821902
FDL TDR64 2 P2

Unclassified report

Descriptors: (*Hypersonic flow, Thermodynamics), (*Aerodynamic characteristics, Aerodynamic configurations), Blunt bodies, Aerodynamic control surfaces, Heat transfer, Pressure, Canard configuration, Swept-back wings, Trailing control surfaces, Delta wings, Flaps, Fins, Wind tunnel models, Graphics, Dihedral angle.

Pressure and heat transfer data were obtained for Mach 8 flows over a blunt pyramidal configuration composed of a 70 degree seep-back delta wing surface and two dihedral surfaces. Trailing edge flap deflections were varied up to 40 degrees on all surfaces and the model was tested with and without canards and ventral fins. The model was pitched at angles of attack between ± 54 degrees and was tested at sideslip angles of 0 and 12 degrees for free stream Reynolds numbers, based on model length, of 1.5 and 4.5 million. (Author)

AD-608 469 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

Bell Aerosystems Co., Buffalo, N. Y.
NONLINEAR THERMOELASTIC EFFECTS ON HYPERSONIC STABILITY AND CONTROL, PART I, VOLUME I, AERODYNAMICS,
by James R. Batt. Sep 64, 72p
Contract AF33 657 7486, Proj. 8219, Task 821901
FDL TDR64 16 pt. 1 vol. 1

Unclassified report

Descriptors: (*Hypersonic flight, Aerodynamic characteristics), (*Aerodynamic characteristics, Hypersonic flight), (*Aerothermoelasticity, Fluid dynamic properties), Airfoils, Lift, Nonlinear systems, Stability, Control, Pressure, Mathematical analysis, Matrix algebra, Angle of attack, Wings.

Linnell's pressure prediction method is used as a basis for developing hypersonic aerodynamic influence coefficient matrices. The method developed accounts for the nonlinear variation of lifting pressure with angle of attack which is present at hypersonic speeds. Comparisons of theoretical and experimental hypersonic pressure distributions are made. (Author)

AD-608 476 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

Bell Aerosystems Co., Buffalo, N. Y.
NONLINEAR THERMOELASTIC EFFECTS ON HYPERSONIC STABILITY AND CONTROL. PART II. ANALYTICAL AND EXPERIMENTAL STATIC AEROTHERMOELASTICITY,
by James R. Batt and Richard H. Gallagher.
Oct 64, 90p
Contract AF33 657 7486, Proj. 8219, Task 821901
FDL TDR64 16 P2

Unclassified report

See also AD-608 469.

Descriptors: (*Aerothermoelasticity, Analysis), (*Hypersonic flow, Aerothermoelasticity), Aerodynamic heating, Aerodynamic loading, Aerostatics, Aeroelasticity, Programming (Computers), Nonlinear systems, Structures, Wings, Surface properties, Mathematical analysis, Angle of attack, Digital computers, Functions, Simulation.

An analytical method was developed for the analysis of static aerothermoelastic behavior in the presence of nonlinear aerodynamic loads and geometrically nonlinear structural behavior. The method was programmed for the IBM 7090 digital computer using FORTRAN coding techniques. A system for the experimental determination of static aerothermoelastic response of nonuniformly heated structures to loadings which are a nonlinear function of wing surface slopes was developed. Results of this experimental program are presented and compared with theoretical predictions. (Author)

10. Fuels and Combustion

AD-608 106 Div. 10
OTS Prices: HC $6.00/MF $1.25

Purdue Univ., Lafayette Ind.
STUDIES IN HYBRID COMBUSTION.
Final summary rept. for 8 Jan 62-17 Jan 64,
by R. J. Zabelka and D. F. Brink. Sep 64, 252p
Contract N123 60530 29155A
NAVWEPS 8541; NOTS TP3550

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hybrid rocket propellants, Burning rate), Hydrazine, Gels, Acrylic resins, Fuels, Oxidizers, Oxygen, Aluminum, Powders, Reaction kinetics, Combustion, Binders, Laminar boundary layer, Turbulent boundary layer.

Studies were conducted to determine the influence of several experimental parameters upon the combustion of certain simple hybrid fuels in laboratory-scale burners. The fuels which were studied included (1) hydrazine gel, composed of liquid hydrazine suspended in a hydrocarbon binder, (2) crosslinked hydrazine gel, composed of hydrazine gel with a small amount of added crosslinking agent, (3) aluminized hydrazine gel, composed of crosslinked hydrazine gel and aluminum powder, and (4) Plexiglas. Gaseous oxygen was used as the oxidizer. The burning rate of the fuel was considered a primary dependent variable in the studies. The independent variables selected for the investigation of their influence upon the burning rate of the fuel included the following: (1) The composition of the fuel, (2) The oxidizer mass flux in the vicinity of the fuel surface, (3) The chamber pressure, (4) The chamber geometry and injector design. (Author)

AD-608 107 Div. 10, 13, 25
OTS Prices: HC $6.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TRANSACTIONS OF POWER ENGINEERING,
10 Sep 64, 262p
FTD TT62 1516; TT 64 71678

Unclassified report

Unedited rough draft trans. of Akademiya Nauk BSSR, Minsk. Instytut Energetyki. Trudy, 1957, v. 3, p. 1-209. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Heating, Engineering), (*Energy management, Heating), Reports, Fuels, Fuel consumption, Urban areas, Gases, Electric power production, Electric currents, Voltage, Gas flow, Costs, Heat transfer, Metals, Driers (Apparatus), Semiconductors, Thermistors, Hydrodynamics, Equations, USSR.

Contents:
Problem of Combining Gas and Heating Supply Systems in Towns; Economic Efficiency of Remote Heat Supply From a TETs Working on Peat; The Expediency of Converting Peat-Fired Condenser Regional Power Stations to Long-Distance TETs; Operating Conditions for Small GES Hydroelectric Stations in a Power System; Method of Determining Heat Transfer in Molten Metals As a Result of Natural Convection; Problem of the Bertinization of Peat in Systems For its Chemical and Electric Power Utilization; Method of Reducing Flue Dust Where an Open Cycle is Used For Drying Shredded Peat; Some Problems on the Aerodynamics of a Fluidized Bed; Experimental Study of the Turbulen Propagation Rate of the Flame in an Air Supension of Peat Dust and Peat Semicoke; Moisture Exchange in a Bed of Polydisperse Material; Results of Tests on Commercial Models of a Continuous Pneumatic Gas Grain Dryer; Nonsteady Conditions in the Waters of Small Hydroelectric Power Stations; Certain Cases of Calculation of the Normal Positive Discharge Wave; Investigation of a DC Circuite Containing A Semiconductor Thermistor; Use of Thermistors For Measurement of Temperature; and Choice of Voltage For a Low-Voltage Metropolitan Line.

AD-608 118 Div. 10, 2, 12
OTS Prices: HC $2.00/MF $0.50

Weather Bureau, Washington, D. C.
METEOROLOGICAL CONSIDERATIONS IN THE HANDLING OF A MIXTURE OF LIQUID FLUORINE AND LIQUID OXYGEN,
by Richard K. Siler. 15 Oct 64, 50p

Unclassified report

Descriptors: (*Liquid rocket oxidizers, Handling), (*Climatology, Liquid rocket oxidizers), Liquified gases, Mixtures, Oxygen, Fluorine, Physical properties, Chemical properties, Air pollution, Atmosphere, Diffusion, Gases, Toxicity, Wind, Fog, Rainfall, Temperature, Dew point, Thunderstorms, Cloud cover, Meteorology, Launching sites.

This report has two purposes: primarily it presents a general climatology for the Cape Kennedy-Merritt Island area of those weather elements pertinent to the use of a mixture of liquid fluorine and liquid oxygen, FLOX; and secondly, it outlines questions regarding the behavior of fluorine in the atmosphere. The physical and chemical properties of fluorine and its pertinent compounds are outlined. Some of the problems that could arise should fluorine be introduced into the atmosphere are discussed and recommendations are offered toward the possible solution of these problems. The general nature of the diffusion of a gas in the atmosphere is discussed briefly and a climatology pertinent to this problem is presented. Also, in the absence of weather observations from Merritt Island, some speculations on possible differences in the weather on Cape Kennedy and on Merritt Island are given.

AD-608 260 Div. 10, 14, 17
OTS Prices: HC $3.00/MF $0.75

Linde Div., Union Carbide Corp., Tonawanda, N. Y.
COMPATIBILITY OF MATERIALS WITH 7500 PSI OXYGEN.
Final rept. for Jun 63-Jun 64,
by G. J. Nihart and C. P. Smith. Oct 64, 94p
Contract AF33 657 11686, Proj. 6373, Task 637302
AMRL TDR64 76

Unclassified report

Descriptors: (*Lubricants, Ignition), (*Metals, Ignition), (*Halocarbon plastics, Ignition), (*Sealing compounds, Ignition), Compatibility, Oxygen, High-pressure research, Heat-resistant metals and alloys, Stainless steel, Nickel, Life support, Brass, Fluorides, Aluminum, Hazards, Tests.

A research program was conducted to develop ignition data on thread lubricants, thread sealants, fluorocarbon plastics, and metals. Spontaneous ignition temperatures were determined in both 2000 psi and 7500 psi oxygen for all the above materials except metals. The spontaneous ignition temperatures for these materials were found to be essentially the same in 7500 psi oxygen and in 2000

psi oxygen. Only three of the tested lubricants are recommended for possible use in 7500 psi systems. None of the thread sealants are recommended. Glass-filled polytetrafluoroethylene is usable only if tightly confined. The relative ease of ignition of metals and alloys was determined by promoted ignition methods in oxygen at 7500 psi. Inconel alloy 600, brass, Monel alloy 400, and nickel were found to have the highest resistance to ignition and combustion among the common alloys and metals. Of the materials tested, stainless steel and aluminum are the least satisfactory for use at oxygen pressures of 7500 psi. A test system was constructed to evaluate the hazards in rapidly charging a 65 cubic inch nickel-lined vessel with high pressure oxygen. A series of rapid charging tests up to as high as 8000 psi proceeded without incident. Electrostatic charges measured during the charging were negligible. (Author)

11. Ground Transportation Equipment

No Entries

12. Guided Missiles

AD-607 994 Div. 12, 30
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
CONTROL SYSTEMS STUDIES.
Semiannual rept. for 1 Jan-30 Jun 59,
by Henry Low. 30 Jun 59, 35p
STL/TR-59-0000-00705
Contract AF04 647 309

Unclassified report

Descriptors: (*Control systems, Guided missiles (Surface-to-surface)), (*Guided missile components, Attitude control systems), Circuits, Control, Servomechanisms, Power supplies, Demodulators, Magnetic amplifiers, Actuators, Inverters, Weapon systems, Energy conversion, Switching circuits, Gyroscopes.

The report is divided into three sections, covering the achievements of the following divisions of study and effort: advanced circuit studies, missile attitude sensors studies, and power servos studies. In the field of advanced circuit studies, packaging evaluation and redesign were undertaken as a continuation to a-c servo channel development, a single-ended switching type power demodulator was developed and indicated satisfactory performance in laboratory evaluation, effort was continued on the design of a d-c servo amplifier, magnetic amplifier circuitry investigations were furthered, preliminary designs were made for modularized three-phase static inverters and a four-ounce static inverter was designed, and four configurations of converter-regulators were completed. In the field of missile attitude sensors, work was performed to support the present weapon systems, new gyros were evaluated, and test equipment was built and purchased for advanced weapon system analysis and proposal evaluation. Power servos studies made progress in establishing laboratory facilities and devising testing techniques; a major portion of the test equipment listed in Project Plan 165-35 was purchased or ordered, and certain work was begun on evaluation and improvement of power servos. (Author)

AD-608 004 Div. 12
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
EQUATIONS FOR YAW-PLANE DISPERSION STUDY,
by E. K. Heist and N. Trembath. 1 May 57, 9p
GM-45.1-115

Unclassified report

Descriptors: (*Guided missiles, Yaw), (*Yaw, Equations), Thrust, Guided missile trajectories, Roll, Wind, Gyroscopes, Vector analysis, Scattering.

The equations used in a recently completed yaw plane dispersion study are developed. Dispersions studied are those caused by wind, yaw displacement gyro drift and offset, roll displacement gyro drift and offset, thrust misalignment, and thrust unbalance. Assumptions included in the equations used are: (1) The pitch plane trajectory is not changed by dispersions in the yaw plane. (2) The magnitude of the velocity of the missile relative to the atmosphere is unchanged by dispersions in the yaw plane. (3) All angles associated with the missile trajectory in the yaw plane are small. Vectors and angles associated with the missile trajectory in the yaw plane are defined. The equations of motion with a wind normal to the standard missile centerline in the yaw plane are developed. The resulting equations are modified to include the other dispersion causes considered. (Author)

AD-608 006 Div. 12
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
A MATHEMATICAL MODEL FOR SATELLITE TRAJECTORIES SIMULATION,
by G. E. Lowitz. Jun 59, 24p
DSPO-M-2, RW-CMCC-79-U-1

Unclassified report

Descriptors: (*Satellites (Artificial), Trajectories), (*Trajectories, Satellites (Artificial)), Elliptical orbit trajectories, Simulation, Mathematical models, Perturbation theory, Fourier analysis, Series, Vector analysis, Astronautics.

This paper describes the motions of a satellite from its youth, when its orbit is a well defined elipse and its sectorial speed nearly constant, to its old age when the trajectory spirals down and the perturbations become more apparent. This paper demonstrates how all the pertinent parameters may be displayed through the use of the basic functions cosine theta and exponential function of time h (t, theta). (Author)

AD-608 011 Div. 12, 15
OTS Prices: HC $6.00/MF $1.25

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
TABLE FOR THE DETERMINATION OF THE MOTION OF SATELLITES ON ELLIPTIC TRAJECTORIES, PART 4,
by G. E. Lowitz. 15 Mar 60, 216p DSPO-TM-15

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Satellities (Artificial), Elliptical orbit trajectories), (*Elliptical orbit trajectories, Satellites (Artificial)), Tables, Motion, Earth, High altitude, Velocity, Time, Integrals, Equations.

This technical Memorandum provides a table, by means of which the position of a satellite on its elliptical orbit, both in time and in space, can be quickly determined. The table yields directly to computation on spatial orbit. By adding the parameters of the motion of the earth, the relative motion of the satellite with respect to the earth is readily obtained.

AD-608 026 Div. 12
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
INTRODUCTION TO SERVOMECHANISM OR CONTROL SYSTEM THEORY,
by C. T. Morrow. Apr 57, 24p STL/GM-01.1-690

Unclassified report

Descriptors: (*Servomechanisms, Theory), (*Guided missiles, Control systems), Mathematical analysis, Integral transforms, Feedback, Stability.

This document contains a definition of servomechanism, or servo system, a statement of the function of a missile control system, a discussion of the stability problem and its relation to complex frequency, a derivation of the feedback equation with emphasis on the use of complex functions to describe signal delays as well as amplifications, a brief discussion of the Nyquist criterion and the root-locus method for investigating stability, and, finally, a brief introduction to the Laplace transform and its applications to servo theory. The treatment of servomechanism theory is based in part on electromechanical analogies as discussed briefly in 'Introduction to vacuum

tubes,' by C.T. Morrow and members of the Technical Training and Scientific Relations group. Such analogies permit treatment of the system as if it were entirely electrical or entirely mechanical in character. (Author)

AD-608 027 Div. 12
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
REACTION WHEEL ATTITUDE CONTROL FOR SPACE VEHICLES,
by Ronald W. Froelich and Harry Patapoff.
Oct 59, 30p
Unclassified report

Prepared for presentation at the IRE National Automatic Control Conference, November 6, 1959, Dallas, Texas.

Descriptors: (*Attitude control systems, Spacecraft), Moment of inertia, Momentum, Thrust vector control systems, Performance (Engineering), Model tests, Power amplifiers, Servomechanisms, Power, Velocity, Torque, Jets, Gases, Electric motors.

An attitude control system consisting of motor-driven inertial wheels in conjunction with an over-riding mass ejection system is proposed for use in space vehicles. Control by mass ejection is used to compensate for initial disturbances during separation from the booster, and for removal of unwanted momentum stored in the wheels. The use of reaction wheels permits fine, damped attitude control. A laboratory model of a single-axis control system was constructed for experimentation and evaluation. The choice of a suitable platform configuration, selection of a prime mover for the inertial wheel, and the philosophy, in the design of the electronics and pneumatics are discussed. Emphasis was placed upon minimization of weight and power consumption. System evaluation includes a discussion of efficiencies, reliability, and torque-speed-power relationships. Sources of disturbances, methods of sensing, and general equations of motion are presented in the Appendix. (Author)

AD-608 029 Div. 12, 22, 30
OTS Prices: HC $3.00/MF $0.75

TRW Space Technology Labs., Inc., Los Angeles, Calif.
THE METHODOLOGY OF CONTROL OF A VERY LARGE RESEARCH AND DEVELOPMENT PROGRAM,
by W. M. Duke. 6 Oct 59, 64p
Unclassified report

Address presented to the Conference on Research and Development Administration, Sagamore Adirondack Conference Center of Syracuse Univ., Raquette Lake, N. Y., 6 Oct 59.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Research program administration, Guided missiles (Surface-To-Surface)), (*Guided missiles (Surface-To-Surface), Research program administration), Weapon systems, Rocket research, Systems engineering, Management engineering, Ordnance.

The initiation and implementation of the Air Force Ballistic Missile Program is discussed.

AD-608 032 Div. 12, 15
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
DERIVATION OF 3 DIMENSIONAL TRAJECTORY EQUATIONS FOR A LIFTING RE-ENTRY VEHICLE,
by J. A. Love and L. W. Neustadt. 9 Nov 60,
12p STL/7431.1-107
Unclassified report

Descriptors: (*Reentry vehicles, Trajectories), (*Trajectories, Equations), Motion, Lift.

This memorandum presents the equations of motion of a lifting re-entry vehicle. They are derived in a form particularly suitable for mechanization on an analog computer. The vehicle is assumed to behave as if it were a point mass moving over a spherical, non-rotating earth which is assumed to be fixed in inertial space.

AD-608 184 Div. 12, 2, 5, 16, 27
OTS Prices: HC $4.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SPACE, 1963, NO. 1.
3 Sep 64, 107p
FTD MT64 239; TT 65 60008
Unclassified report

Edited machine trans. of Kosmos (USSR) 1963, no. 1, p. 1-96.
Includes trans. of p. 3-24, available from OTS $0.75 as AD-600 893, FTD-TT-63-1132, 28 Apr 64, 29p.

Descriptors: (*Space flight, Stars), (*Closed ecological systems, Space flight), (*Space communication systems, Stars), (*Astronautics, Space biology), (*Ionosphere, Charged particles), Satellites (Artificial), Space propulsion, Plants (Botany), Algae, Gas ionization, USSR, Photons.

Contents:
Interstellar flights, by K. P. Stanyukovich and V. A. Bronshten; Creation of habitable medium in future space flights of man, by A. A. Nichiporovich; Astronautics and extraterrestrial civilizations, by V. I. Krasovskiy; Problems of interstellar communication, by G. Kokkoni and F. Morrison; Study of interplanetary gas and ionospheres of planets with the help of traps of charged particles, by K. I. Gringauz.

AD-608 262 Div. 12, 25
OTS Prices: HC $2.00/MF $0.50

Iowa State Univ., Iowa City.
DATA ACQUISITION AND REDUCTION. PHASE VI, PART I: BALLOTING PHENOMENA IN ROCKET-LAUNCHER FIRINGS.
Rept. no. 11,
by James E. Crosheck. 22 Jul 64, 46p
Contract DA11 070 508ORD1232, Proj. 517 01 002
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rockets, Vibration), (*Rocket launchers, Vibration), Numerical analysis, Force (Mechanics), Data, Motion, Design, Equations, Reduction.

The report presents the results of a study of the balloting behavior of a rocket on a straight rail launcher. Numerical computations were made for two angles of elevation and are presented in graphical form. (Author)

AD-608 295 Div. 12, 2
OTS Prices: HC $7.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROBLEMS OF MOTION OF ARTIFICIAL CELESTIAL BODIES.
7 Aug 64, 326p
FTD MT64 226; TT 65 60107 Unclassified report
Problemy Dvizheniya Iskusstvennykh Nebesnykh Tel, Edited machine trans. of mono. Konferentsii po Obshchim i Prikladnym Voprosam Teoreticheskoi Astronomii (Conference on General and Applied Problems of Theroretical Astronomy) Moscow, 1961. Doklady, 1963, 294p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Celestial mechanics, Satellites (Artificial)), (*Satellites (Artificial), Celestial mechanics), (*Astronautics, Celestial mechanics), Planets, N-body problem, Motion, Gravity, Perturbation theory, Orbital trajectories, Astronomical geodesics, Position finding, Doppler effect, Venus probes, Astrophysics, Numerical methods and procedures, USSR.

Contents: Qualitative qustions of celestial mechanics; Problems of motion of artificial earth satellites; Numerical methods of celestial mechanics; Definition of orbits; Questions on translational-rotary motion and attraction of celestial bodies.

AD-608 308 Div. 12, 30
OTS Prices: HC $6.00/MF $1.25

Army Missile Test and Evaluation Directorate, White Sands Missile Range, N. Mex.
TEST OF AUDIO-VISUAL INFORMATION SYSTEM(A-VIS).
Final rept. for 18 May-23 Jun 64.
Sep 64, 210p
Projs. 1B2 42104D226, 3 4 0402 12
AMTED 65 2 Unclassified report
Rept. on Proj. NIKE X.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Maintenance), (*Guided missiles (Surface-to-air), Maintenance equipment), Model tests, Checkout procedures, Maintenance personnel, Checkout equipment.

This is the final report of a test of the relative effectiveness of an Audio-Visual Information System, when compared to standard technical manuals as a maintenance aid. The test was conducted by the NIKE X Engineering/Service Test Operation, White Sands Missile Range, New Mexico, during the period 18 May 1964 through 23 June 1964. The test was conducted at the request of NIKE X Project Office, AMC. The responsibility of the testing agency consisted of complete conduct, direction, and assistance to the contractor in preparation for the test. Due to the large amount of data collected and the nature of the findings, it is not feasible to attempt to summarize the findings, conclusions, and/or recommendations within the abstract. (Author)

AD-608 316 Div. 12
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
AN ANALYSIS OF THE ROTATIONAL MOTION OF A BODY DURING RE-ENTRY.
Revised ed.,
by T. B. Garber. 28 Jun 61, 60p RM1863-1
Contract AF49 638 700
Revised ed. of 28 Jan 57. Unclassified report

Descriptors: (*Atmosphere entry, Reentry vehicles), (*Reentry vehicles, Rotation), (*Aerodynamic characteristics, Reentry vehicles), Oscillation, Stability, Motion, Spin, Lift, Trajectories, Equations.

The dynamical equations of motion are formulated for a body during re-entry into the atmosphere. With the assumption that the translational and rotational degrees of freedom may be treated independently, an analysis is undertaken of the oscillatory motion of a re-entry vehicle which is spinning about its longitudinal axis. The influence of the spin rate and the static margin upon the stability of the transient solution of the equations of motion is considered, and it is concluded that satisfactory dynamical behavior of the re-entry body may be anticipated if the static margin of the vehicle is less than zero, the spin rate is in the range 0.5 to 2 radians per second, and the lift curve has a slope equal to or greater than zero. An examination of the precessional and nutational motion of the vehicle is also made, and the effect of initial conditions upon these modes of oscillation is indicated.

AD-608 358 Div. 12, 22
OTS Prices: HC $3.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
A FORTRAN PROGRAM FOR CALCULATING THREE-DIMENSIONAL BALLISTIC TRAJECTORIES,
Technical note,
by Charles F. Ostner and H. Spence Dupree, Jr.
Oct 64, 52p BrownEng-R-115
Unclassified report

Descriptors: (*Ballistics, Programming (Computers), (*Trajectories, Programming (Computers)), (*Programming (Computers), Ballistics), Equations, Programming languages, Compilers, Digital computers, Rocket trajectories, Guided missile trajectories, Spacecraft.

This program computes a ballistic trajectory from launch or any point thereafter to any other time or to impact. Point masses and a rotating oblate spheroid earth are assumed. The program is written in FORTRAN IV and is used on the IBM 7040 computer. It will accommodate a one, two, or three stage vehicle. (Author)

AD-608 368 Div. 12
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE APPLICATION OF DYNAMIC PROGRAMMING TO ORBIT TRANSFER PROCESSES,
by F. T. Smith. Oct 64, 92p P-2957-1
Unclassified report

Paper presented at the AGARD/NATO Lecture series on Orbit Optimization and Advanced Guidance Instrumentation at Dusseldorf, Germany, October 15, 1964.

Descriptors: (*Dynamic programming, Transfer trajectories), (*Transfer trajectories, Dynamic programming), Mathematical programming, Decision theory, Orbital trajectories, Astronautics, Optimization.

Contents: Dynamic programming and multistage decision processes; Orbit transfer processes as continuous decision processes; Orbit transfer processes as discrete decision processes; System performance indexes; The optimization of continuous decision processes; A satellite rendezvous problem as a continuous decision process; The optimization of discrete decision processes; Correction of a 24-hour satellite orbit as a discrete decision process.

13. Installations and Construction

AD-608 062 Div. 13
OTS Prices: HC $1.00/MF $0.50

General Testing Labs., Moonachie, N. J.
DETERMINATION AND EVALUATION OF STRESSES ON IN-PAVEMENT RUNWAY LIGHTING.
Final rept.,
by Ivan M. Silver. Jul 64, 24p
Proj. 421 031 00X,
FAA RD64 118

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Runways, Marker lights), (*Marker lights, Runways), Tests, Instrumentation, Maintenance, Failure (Mechanics), Shock (Mechanics), Vibration, Experimental data.

An investigation was made to determine the shock and vibration levels that centerline runway lights experience in normal service. The tests were performed 1500 feet from threshold of Runway 13 at the National Aviation Facilities Experimental Center, Atlantic City, New Jersey. The results indicate that the natural frequency of the light assemblies are excited and the magnitudes of these vibrations are considerably above the test amplitudes that have been employed for product evaluation. The purpose of this study was to measure the actual shock and vibration levels experienced by the light fixtures due to aircraft and ground service vehicles and to determine the effect these levels would have on light failure. Additionally it was desired to develop the information necessary to reevaluate the design criteria for these light fixtures. (Author)

AD-608 178 Div. 13
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THERE IS SUCH A MACHINE,
by E. Temchin. 27 Oct 64, 9p
FTD TT64 117; TT 65 60002

Unclassified report

Unedited rough draft trans. from Ekonomicheskaya Gazeta (USSR) 1964, no. 7(132) p. 40.

Descriptors: (*Refrigeration systems, Scientific research), Vortices, Production, USSR.

A popularized article on the development of a turbo-cooling refrigeration system is presented. Although the machine does not work on the same principles as the vortical tube, the two systems share common properties. For example, air at room temperature is fed to the machine and cold and hot air are obtained from it. The system operates without the use of evaporizers, condensers, etc. The basic elements of a turbojet engine are used as operational bases.

AD-608 225 Div. 13, 7, 2, 20
OTS Prices: HC $6.00/MF $1.25

North American Aviation, Inc., Downey, Calif.
A STUDY OF THE FEASIBILITY OF USING NUCLEAR VERSUS SOLAR POWER IN WATER EXTRACTION FROM ROCKS.
Scientific rept. no. 1,
by J. Green. 31 Jul 64, 252p SID-64-1430
Contract AF19 628 3292, Proj. 0000
AFCRL 64 733

Unclassified report

Descriptors: (*Moon, Water supplies), (*Rock (Geology), Water supplies), Solar cells, Nuclear power plants, Nuclear reactors, Power reactors, Igneous rock, Obsidian, Basalt, Mirrors, Parabolic bodies, Chemical analysis.

Theoretical and experimental research on nuclear versus solar power is presented relative to the extraction of water from predicted lunar surface materials. Various problem areas are outlined that cover reactor and solar heat sources, techniques involved in the analysis of materials to be used with these heat sources, and the engineering and logistics aspects of using these energy sources. Welded tuff and altered volcanics are thought to be the 'best' material for obtaining water in lunar basing operations. (Author)

AD-608 359 Div. 13
OTS Prices: HC $3.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
A PROCEDURE IN THE DESIGN OF SPHERICAL DOMES.
Technical note,
by Rolland G. Sturm. Jul 64, 56p BrownEng-R-109
Contract NAS8 5289

Unclassified report

Descriptors: (*Spheres, Structures), (*Structural shells, Design), Structural parts, Geometric forms, Stresses, Loading (Mechanics), Rings, Stability, Thickness.

The study discusses the merits of three types of spherical domes. A design procedure which generally applies to all types is given in step by step form for one type of spherical dome. Mathematical expressions are given without detailed derivation but with reference to sketches from which the derivations can be developed. Throughout the discussion it is assumed that the reader is acquainted with simple structural design procedures. (Author)

AD-608 423 Div. 13, 17, 31
OTS Prices: HC $1.00/MF $0.50

Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
WELDED CONTINUOUS FRAMES AND THEIR COMPONENTS.
Final rept. for 1 Oct 63-30 Sep 64.
30 Sep 64, 9p Fritz-205.4
Contracts NObs90041, NBy53160, Proj. SF013 03 01, Task 1974

Unclassified report

Descriptors: (*Structures, Loading (Mechanics)), (*Steel, Structural parts), (*Structural parts, Buckling (Mechanics)), Beams (Structural), Panels (Structural), Welds, Elasticity, Deformation, Metal plates, Reinforcing materials, Structural properties, Tensile properties.

The topic of this investigation has been the plastic strength of indeterminate steel structures and the study of the plastic behavior of the component parts of such structures. A special portion of the work has been an investigation of the strength of longitudinal stiffened plate panels. This report also covers work conducted on the strength and stability of high strength steel frames and their components.

14. Materials (Non-Metallic)

AD-608 000 Div. 14, 8, 26
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Center, Pittsburgh, Pa.
LAMINATES FOR HIGH TEMPERATURE.
Monthly letter rept. no. 11, Aug 63,
by J. H. Freeman. 30 Aug 63, 12p
Contract AF33 657 9078

Unclassified report

Descriptors: (*Laminates, Heat-resistant plastics), (*Heat-resistant plastics, Laminates), (*Radomes, Laminated plastics), (*Glass textiles, Laminates), Aging (Materials), Polymers, Plasticity, Plastics, Impregnation, Polyamide plastics, Aromatic compounds, Organic compounds, Electrical properties, Dielectrics, Viscosity, Composite materials.

An investigation was made of the volatile content and flexural properties of laminates fabricated for use in radomes for 600 F service. The electrical properties of aromatic imide laminates is given before and after aging at temperatures from 77 to 600 F.

AD-608 002 Div. 14, 8, 26
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Center, Pittsburgh, Pa.
(LAMINATES FOR HIGH TEMPERATURE).
Monthly letter rept. no. 7, Feb 63,
by James H. Freeman. 28 Feb 63, 6p
Contract AF33 657 9078

Unclassified report

Descriptors: (*Laminates, Heat-resistant plastics), (*Heat-resistant plastics, Laminates), (*Radomes, Laminated plastics), (*Glass textiles, Laminates), Plastics, Aging (Materials), Viscosity, Polymers, Electrical properties, Dielectrics, Polyamide plastics, Aromatic compounds, Plasticity, Organic compounds, Composite materials.

An investigation was made of polymers to be used as dielectric material in fabrication of radomes for 600 F service. The viscosity of the polymers was determined. Electrical properties of laminates made with the polymers was measured as a function of temperature.

AD-608 035 Div. 14, 11, 22
OTS Prices: HC $0.50/MF $0.50

Rock Island Arsenal Lab., Ill.
THE DEVELOPMENT OF ELASTOMERIC VULCANIZATES FOR TRACK PAD APPLICATIONS,
by J. W. McGarvey and W. M. Veroeven. 10 Sep 64, 29p
Proj. 1D5 21801D262
RIAL 64 2678

Unclassified report

Descriptors: (*Vulcanizates, Vehicle tracks), (*Vehicle tracks, Vulcanizates), (*Elastomers, Vulcanizates), Synthetic rubber, Carbon black, Additives, Heat transfer, Loading (Mechanics), Physical properties, Fibers, Thermal properties, Polymers, Butyl rubber, Nitrite rubber, Life expectancy, Wear resistance, Particle size, Molecular structure, Failure (Mechanics).

Various synthetic elastomers were compounded for improved stress - strain properties at room temperature and at elevated temperatures and low heat build-up or hysteresis. Track pads for service testing by the U. S. Army Tank Automotive Center were fabricated from promising recipes based on: an ethylene propylene terpolymer; a poly (oxy) propylene; an SBR/cis 1,4-polybutadiene blend and a flock filled SBR. The heat transfer characteristics of vulcanizates compounded with various types of carbon black were also studied. In general, the rate of heat transfer was found to increase as the particle size, loading and structure of the filler was increased. (Author)

AD-608 043 Div. 14
OTS Prices: HC $2.00/MF $0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson, AFB, Ohio.
AN APPROACH TO THE PREPARATION OF POWDERS, FIBERS, AND FILMS OF ULTRA-HIGH PURITY CERAMICS.
Rept. for Aug 63-Aug 64,
by K. S. Mazdiyasni and C. T. Lynch. Sep 64, 44p
Proj. 7350, Task 735001
ML TDR64 269

Unclassified report

Descriptors: (*Ceramics materials, Preparation), Ceramics fibers, Ceramic coatings, Films, Powders, Transition elements, Rare earths, Metalorganic compounds, Decomposition, Oxides, Zirconium compounds, Hafnium compounds, Refractory coatings, Particle size, Pyrolysis, Synthesis (Chemistry), Purification, Graphite, Coatings, Yttrium compounds.

Specifically selected organo-metallic compounds can be made which will decompose to form familiar ceramic materials such as the refractory borides, carbides, nitrides, and oxides. This approach provides unlimited flexibility in the selection of starting compounds because of the great variety of organic compounds available. The thermal decomposition of organo-metallic compounds in the vapor phase produces high purity, fine particle size powders, coatings and thin films, or fibers, by controlled pyrolysis conditions. Transition and rare earth metal alkoxides have been investigated. Compounds of the type M(OR)3 and M(OR)4 where M is Ti, Zr, Hf, Th, Y, Yb, and Dy, and various alkyl groups such as C4H9- and C5H11- have been studied. The metal-oxygen bond in these compounds is very stable and thermal decomposition is complete to the oxides. A method has been developed to produce on a continuous basis zirconia and hafnia with an average particle size of less than 100A and a purity of 99.9(5+) percent. Adherent coatings of refractory oxides on graphite have been made by thermal decomposition of the alkoxides at the substrate surface. (Author)

AD-608 071 Div. 14, 4, 12
OTS Prices: HC $5.00/MF $1.00

Carbon Products Div., Union Carbide Corp., Lawrenceburg, Tenn.
IMPROVED GRAPHITE MATERIALS FOR HIGH-TEMPERATURE AEROSPACE USE. VOLUME I. RESEARCH AND DEVELOPMENT FOR IMPROVED GRAPHITE MATERIALS.
Rept. for 1 May 63-31 Mar 64.
Sep 64, 158p
Contract AF33 657 11171, Proj. 7350, Task 735002
ML TDR64 125 VI

Unclassified Report

See also AD-605 942.

Descriptors: (*Graphite, Preparation), (*Hydrocarbons,

Pyrolysis), Aromatic compounds, Pitch (Materials), Aromatic compounds, Heterocyclic compounds, Molecular structure, Crystal lattices, Synthesis (Chemistry), Nuclear spins, Nuclear magnetic resonance, Absorption spectrum, Thermal expansion, Additives, Organic oxygen compounds, Carbon black, Asphalt, Refractory materials, Refractory coating, Thermochemistry.

The pyrolysis behavior of two different pitches has been examined in a thermogravimetric apparatus. Electron spin resonance (ESR) spectra have been obtained under conditions of high resolution for solutions of acenaphthylene in m-quinquephenyl. Nuclear magnetic resonance (NMR) measurements are reported for some aromatic ions, aromatic pyrolysis products, and complex raw materials for graphite. The thermal decomposition of organic diazo-compounds has been investigated as an example of a pyrolysis reaction involving radical intermediates but yielding stable diamagnetic products. X-ray data have been obtained for the 002 semilattice spacing in graphite prepared from pure aromatic hydrocarbons and from complex raw materials. Molecular structure is seen to influence graphite properties, through both steric and reactivity effects. The addition of carbon blacks to coking charge stocks prior to the coking operation results in cokes which have isotropic high thermal expansion characteristics. Testing shows that the original coke properties affect the final graphite properties.

AD-608 092 Div. 14, 12, 17
OTS Prices: HC $5.00/MF $1.00

Union Carbide Corp., Parma, Ohio.
HIGH TEMPERATURE PROTECTIVE COATINGS FOR GRAPHITE.
Summary technical rept. for 1 Jun 63-31 May 64,
by J. M. Criscione, R. A. Mercuri, E. P. Schram, A. W. Smith, and H. F. Volk. Oct 64, 154p
Contract AF33 657 11253, Proj. 7350, Task 735002
ML TDR64 173 P2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Graphite, Refractory coatings), (*Refractory coatings, Graphite), (*Coatings, Graphite), Protective treatments, Oxidation, High-temperature research, Diffusion, Permeability, Reaction kinetics, Refractory materials, Oxides, Evaporation, Iridium, Carbon, Rhodium, Chemical reactions, Zirconium compounds, Hafnium compounds, Thorium compounds, Eutectics, Carbides, Borides, Plasma medium, Nose cones, Hypersonic flight, Environmental tests, Oxygen, Water vapor.

A comprehensive program to provide fundamental information concerning various factors controlling the oxidation behavior of protective coating systems for graphite at temperatures up to 2200C is outlined and described. Work presented includes: the evaporation of iridium in the presence of oxygen and water vapor to temperatures of 1300C; the results of studies involving carbon diffusion through iridium; the permeability of iridium, rhodium, ZrO2, HfO2, and ThO2 to oxygen at temperatures of 2000C; the coating of graphite with iridium, including the carbon iridium eutectic temperature determination; the reactions of iridium and rhodium with ZrB2, HfB2, ZrC, HfC, and ThC2; the kinetics of the carbothermic reduction of ZrO2, HfO2, and ThO2 to temperatures in excess of 2000C; the chemical reactions of graphite with ZrB2 and HfB2; and arc plasma tests of iridium-coated graphite. The diffusivity, permeability, and kinetic data are presented in the form of mathematical expressions. A mechanism for the diffusion of oxygen through the refractory oxides based on ion vacancy transport is presented. (Author)

AD-608 103 Div. 14, 4, 25
OTS Prices: HC $2.00/MF $0.50

Ohio State Univ., Columbus.
THE STABILITY OF TUNGSTEN IN CARBURIZING AND OXIDIZING ATMOSPHERES.
Rept. for 1 Mar 61-28 Feb 64,
by J. E. Battles, R. Speiser, and G. R. St. Pierre.
Aug 64, 50p
Contract AF33 616 8005, Proj. 7312, Task 731202
ML TDR64 272

Unclassified report

Descriptors: (*Tungsten compounds, Oxides), (*Ceramic materials, Mass spectroscopy), Water, Vapor pressure, Dissociation, Oxidation, Oxygen, Vapors, Sublimation, Stability, Controlled atmospheres.

The Final Report is based primarily on the mass spectrometric investigations of the tungsten-oxygen vapor species. The dissociation energies of W2O6, W3O9, and W4O12 to the atoms have been determined. In addition, the equilibrium vapor over condensed W/WO2 and W20O58/WO3 have been measured. Part II of the report concludes the studies on interaction between the oxides of tungsten and water vapor. (Author)

AD-608 104 Div. 14, 25
OTS Prices: HC $4.00/MF $0.75

Korad Corp., Santa Monica, Calif.
LASER MATERIALS RESEARCH. Part II. NEW MATERIALS.
Final rept.,
by R. C. Pastor and R. H. Hoskins. Sep 64, 120p
Contract AF33 657 11395, Proj. 5237, Task 523701
AL TDR64 195 P1

Unclassified report

Rept. includes Appendices I-III.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 105.

Descriptors: (*Lasers, Materials), (*Gadolinium compounds, Oxides), (*Lanthanum compounds, Oxides), Impurities, Neodymium, Ions, Crystal growth, Additives, Spectroscopy, Pyrolysis, Coatings, Purification, Contamination, Stabilization, Thermodynamics, Reaction kinetics, Spinels, Magnesium compounds, Aluminum compounds, Aluminates, Phase studies.

The objective of this phase of the LASER Materials Research Program was the development of new LASER materials. Two new LASER hosts, Gd2O3 and La2O3, were developed during the contract period and data on LASER operation with Nd+3 as the active ion is presented. Crystal growth problems are discussed, and spectroscopic data on various additives are given. Studies of the growth of several binary oxide hosts system, together with preliminary spectroscopic data, are also discussed. (Author)

AD-608 105 Div. 14, 25
OTS Prices: HC $4.00/MF $1.00

Korad Corp., Santa Monica, Calif.
LASER MATERIALS RESEARCH. PART I. RUBY IMPROVEMENT.
Final rept.,
by R. C. Pastor and R. H. Hoskins. Sep 64, 130p
Contract AF33 657 11395, Proj. 5237, Task 523701
AL TDR64 195 P1

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-417 635.

Descriptors: (*Lasers, Materials), (*Materials, Lasers), Ruby, Crystals, Powders, Aluminum compounds, Oxides, Chromium compounds, Aluminum compounds, Temperature.

The objective of this phase of the LASER Materials Research Program has been the improvement of the crystal quality of Verneuil (flame fusion) ruby. The study has been directed toward the over-all achievement of a steady state operation of this method of crystal growth. New approaches to the materials problems, experimental techniques, and results obtained are presented. Various subsidiary processess have been investigated with respect to a steady state operation. Useful experimental parameters relevant to the successful matching of auxiliary processes are discussed. (Author)

AD-608 133 Div. 14
OTS Prices: HC $0.50/MF $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
ADHESION OF SPECIFICATION FINISHES TO EPOXY RESIN PRIMER MIL-P-52192(ORD),
by John A. Rakaczky. 8 Sep 64, 25p
Proj. I H O 24401A110 05
OCL 167

Unclassified report

Descriptors: (*Adhesion, Finishes and Finishing), (*Finishes and finishing, Paint primers), (*Paint primers, Epoxy plastics), (*Epoxy plastics, Paint primers), Amines, Films, Varnishes, Ceramic coatings, Protective treatments, Humidity, Test methods.

A study was made to determine the factors that might affect the intercoat adhesion between specification finishes and epoxy resin primer MIL-P-52192. It was determined that the migration of unreacted amine to the surface of air dried epoxy primer films could adversely affect intercoat adhesion when subjected to accelerated laboratory tests. However, there was no evidence of this on systems subjected to 2 1/2 years exterior exposure. To minimize the possibility of intercoat adhesion problems the following recommendations are made: (a) Apply the finish coat within 4 hours after application of primer; (b) if the finish coat cannot be applied within 4 hours, the primer should be given a light sanding immediately prior to painting; (c) if possible bake the primer for one hour at 300F. (Author)

AD-608 135 Div. 14, 17
OTS Prices: HC $4.00/MF $1.00

Metals and Controls, Inc., Attleboro, Mass.
STUDY OF DUCTILE COATINGS FOR THE OXIDATION PROTECTION OF COLUMBIUM AND MOLYBDENUM ALLOYS.
Final rept. for 1 Jul 63-30 Jun 64,
by J. J. Buchinski and E. H. Girard. Oct 64, 133p
Contract NOw 63 0706c

Unclassified report

Descriptors: (*Coatings, Refractory metal alloys), (*Molybdenum alloys, Coatings), (*Niobium alloys, Coatings), (*Protective treatments, Oxidation), Platinum, Platinum alloys, Rhodium alloys, Ductility, Diffusion, Cladding, Life expectancy, High-temperature research, Palladium alloys, Microstructure, Surface properties, Zirconium compounds, Oxides, Rhenium, Gold, Aluminum, Boron compounds, Nitrides, Aluminum compounds, Refractory metal alloys.

Platinum and Pt-10% Rh were examined as potential ductile oxidation resistant coatings for FS-85 (Cb-28Ta-10W-1Zr) and TZM (Mo-0.5Ti-0.1Zr). Oxidation tests on coating materials showed that 2-mil thicknesses would provide over 100 hours of protection up to 3000F in the absence of diffusion degradation. Roll bonded and hermetically sealed binary composites were evaluated for oxidation and diffusion behavior. Coating lifetimes of 5 to 15 hours at 2550F were attained before diffusion induced failure occurred. No significant differences were observed between static and cyclic oxidation behavior. Failure mechanisms of FS-85 and TZM composites were shown to be substantially different from each other. Six materials were evaluated in screening tests for potential diffusion barriers. Only ZrO_2 showed any merit, while Re, Au, Al, BN and Al_2O_3 did not. (Author)

AD-608 144 Div. 14, 4
OTS Prices: HC $3.00/MF $0.75

Olin Mathieson Chemical Corp., New Haven, Conn.
DEVELOPMENT OF NONFLAMMABLE HYDRAULIC FLUIDS AND LUBRICANTS.
Final rept. for Oct 63-Oct 64,
by E. H. Kober, H. F. Lederle, and G. F. Ottmann.
17 Nov 64, 70p
Contract NObs90092

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-607 489.

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), (*Lubricants, Synthesis (Chemistry)), Flammability, Organic phosphorus compounds, Organic nitrogen compounds, Wear resistance, Physical properties, Specifications, Acceptability.

A large number of trimeric and tetrameric aryl-1, 1-di-H-polyfluoroalkyl phosphonitrilates was synthesized and evaluated. Several of these products meet or approach the requirements specified in MIL-H-19457 A (Ships) for pour point, volatility, viscosity, density, spontaneous ignition temperature, and thermal and hydrolytic stability; these compounds also display excellent wear properties. Several trimeric and tetrameric arylamino-polyfluoroalkoxy phosphonitriles were prepared. The properties of a few representatives of this novel class of compounds come close to meeting the requirements for naval hydraulic fluids. Addition to ethylene oxide or glycidol to hydroxy-aryloxy- or amino-aryloxy-phosphonitriles gave water soluble products which have potential for use in water base hydraulic fluids. (Author)

AD-608 153 Div. 14, 31
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
ANALYSIS OF FILAMENT-WOUND PRESSURE VESSELS.
Revised ed.,
by Oscar Hoffman. 15 Apr 61, 38p LMSC-480823
Contract NOrd17017

Unclassified report

Descriptors: (*Pressure vessels, Filament wound construction), (*Filament wound construction,

Composite materials), (*Composite materials, Filament wound construction), (*Submarine hulls, Filament wound construction), Glass textiles, Membranes, Plastics, Stresses, Mathematical analysis, Deformation, Shear stresses, Filaments, Structural shells, Structures, Tentile properties, Steel, Wire, Epoxy plastics.

This report gives a systematic and comprehensive presentation of methods for analyzing stresses and deformation in filament-wound pressure vessels. The stress-strain relations for elastically anisotropic materials, in general, and for the particular anisotropy displayed by filament-wound shell structures are discussed as essential fundamental premises to the analyses developed. Many important applications of the general theory to laminated structural elements have been developed. Recently, cylindrical pressure vessels and closure domes have been investigated under the assumption that the filaments are the only load-carrying elements in the composite structure. This so-called netting analysis approach is investigated and re-formulated as the limiting case of a more general analysis which includes contributions of both the filaments and the resinous matrix to the strength of the structure. The latter approach is, of course, indispensable for the analysis of the bending and shearing stresses caused by discontinuity (or edge) effects. Analysis of these stresses is developed in the remaining sections of this report.

AD-608 217 Div. 14, 8
OTS Prices: HC $5.00/MF $1.00

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TECHNOLOGY OF NEW DEVITRIFIED CERAMICS - A LITERATURE REVIEW.
Master's thesis,
by Barry R. Emrich. Sep 64, 162p
Proj. 7381, Task 738105
ML TDR64 203

Unclassified report

Descriptors: (*Ceramic materials, Glass), (*Glass, Ceramic materials), Crystallization, Nucleation, Crystal growth, Structural properties, Crystal structure, Tensile properties, Oxides, Magnesium compounds, Aluminum compounds, Silicon compounds, Titanium compounds, Radomes, Electron tubes, Films, Lithium compounds, Aluminum compounds, Friction, Wear resistance, Optical glass, Sandwich construction, Ceramic coatings, Adhesives, Honeycomb cores, Machining, Finishes and finishing, Mechanical properties.

A comprehensive review of the worldwide open literature was made to assist the research and development engineer in future work and inform the applications engineer of the present uses and capabilities of devitrified ceramics. The devitrified ceramics of primary concern are those materials which are predominantly crystalline bodies produced by induced and controlled nucleation and crystallization of preformed glass articles. This study presents information on compositional and processing factors; fundamental phenomena; properties; the effects of crystal size, heat treatment, and composition on properties; and applications. It also includes selected abstracts. This documentary search concludes that devitrified ceramics are only in their infancy and that there is an urgent need for further development and understanding of fundamental characteristics in order to realize the full potential of these relatively new ceramic materials. (Author)

AD-608 229 Div. 14, 4, 25
OTS Prices: HC $2.00/MF $0.50

Keck (W. M.) Lab. of Engggineering Materials, Calif. Inst. of Tech., Pasadena.
PHYSICOMECHANICAL BEHAVIOR OF RUBBERLIKE MATERIALS.
Polymer science rept.,
by P. J. Blatz, N. George, W. L. Ko, A. Murthy, and J. Yoh. Sep 64, 49p MATSCIT-PS-64-8
Contract AF04 611 9572

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Elastomeres, Physical properties), (*Synthetic rubber, Physical properties), (*Free radicals, Polymerization), Vulcanizates, Mechanical properties, Tensile properties, Statistical distributions, Statistical functions, Relaxation time, Strain (Mechanics), Loading (Mechanics), Creep, Viscoelasticity, Electrical properties, Electric bridges, Molecular structure, Reaction kinetics.

Contents: Mechanical behavior of gum rubber vulcanizates (geometry of ring specimens, non-gaussian statistics, distribution function for relaxation times, finite viscoelasticity); Electrical behavior of gum rubber vulcanizates (bridge analysis); Kinetics of free radical polymerization.

AD-608 230 Div. 14, 4, 25
OTS Prices: HC $2.00/MF $0.50

Keck (W. M.) Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
PHYSICOMECHANICAL BEHAVIOR OF RUBBERLIKE MATERIALS.
Polymer Science rept.,
by P. J. Blatz and W. L. Ko. May 64, 28p
MATSCIT-PS-64-3
Contract AF04 611 9572

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Elastomeres, Physical properties), (*Synthetic rubber, Physical properties), (*Free radicals, Polymerization), Vulcanizates, Tensile properties, Failure (Mechanics), Silicone plastics, Additives, Graphite, Resistance (Electrical), Molecular structure, Reaction kinetics, Mechanical properties, Electrical properties.

Contents:
Mechanical behavior of gum rubber vulcanizates; Electrical behavior of gum rubber vulcanizates; Kinetics of free radical polymerization.

AD-608 301 Div. 14, 17
OTS Prices: HC $3.00/MF $0.75

Union Carbide Corp., Parma, Ohio.
RESEARCH STUDY TO DETERMINE THE PHASE EQUILIBRIUM RELATIONS OF SELECTED METAL CARBIDES AT HIGH TEMPERATURES,
by R. V. Sara and C. E. Lowell. Oct 64, 66p
Contract AF33 657 8025, Proj. 7350, Task 735001
WADD TDR60 143

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Carbides, Phase studies), (*Tantalum compounds, Carbides), (*Hafnium compounds, Carbides), (*Boron compounds, Carbides), Refractory materials,

Metallography, X-ray diffraction analysis, Crytal lattices, Thermodynamics, Solid solutions, Microstructure.

The work summarized in the report is the result of investigations of phase equilibria in the binary systems, tantalum-carbon, hafnium-carbon, and boron-carbon. A completed phase diagram which encompasses experimental results and considerations heretofore unreported in the literature, is presented for the hafnium-carbon system. A phase diagram for the tantalum-carbon system is included. Preliminary studies on the hafnium carbide-tantalum carbide quasi-binary were limited to temperatures of 3700 C at which no liquid formation was evident. Results for the boron-carbon system depicting maximum boron solubility in the graphite lattice at and near the eutectic temperature of approximately 2390 C, are also included. (Author)

AD-608 331 Div. 14, 4, 25
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
THE VISCOELASTIC RELAXATION MECHANISMS OF INORGANIC POLYMERS: THE POLYPHOSPHORYLDIMETHYLAMIDES.
Technical rept. no. 5,
by A. Eisenberg and L. Teter. Sept 64, 22p
Contract Nonr233 87
Unclassified report

Prepared for Presentation before the 1964 Meeting of the Society of Rheology, Pittsburgh, Pa., 26-28 Oct 64.

Descriptors: (*Inorganic polymers, Viscoelasticity), (*Phosphorus compounds, Inorganic polymers), Organic phosphorus compounds, Amides, Mechanical properties, Stresses, Relaxation time, Molecular structure, Chemical bonds, Transition temperature, Molecular weight.

The viscoelastic properties of the polyphosphoryldimethylamides were investigated by the technique of stress relaxation as a function of the P to N ratio, and therewith of the chain length. From the great similarity of the shape of the curves to those of 'normal' organic polymers, i.e. poly(methyl methacrylate) or polystyrene as a function of the molecular weight, as well as from the difficulty of preparing samples below the gelpoint, it is concluded that the relaxation mechanism in the flow region is molecular flow, with bond interchange along the backbone either completely absent or present to only a minor extent. (Author)

AD-608 357 Div. 14, 1
OTS Prices: HC $2.00/MF $0.50

Research and Technology Div., Air Force Systems Command, Washington, D. C.
THERMAL STABILITY OF FLEXIBLE FIBROUS MATERIALS,
by Jack H. Ross and C. O. Little. Oct 64, 34p
Proj. 7320, Task 732002
RTD TDR63 4031
Unclassified report

Descriptors: (*Fibers (Synthetic), Fire-resistant textiles), (*Fire-resistant textiles, Fibers (Synthetic), Environmental tests, Heat transfer, Textiles, Paper, Nylon, Dacron, Asbestos, Carbon, Thermal properties, Aircraft fires, Fire safety, Synthetic rubber.

The continuing need for new thermally stable fibrous materials for the protection of aircrew decelerators prompted an investigation to develop a laboratory technique for simulating the heat and air flow encountered in aircraft fires. With the device available, a number of fibrous materials in single and multiple layers were characterized for thermal stability in the environment simulating that encountered during emergency escape from burning aircraft. This environment involved exposure to 1200 or 1400F for 10 seconds at an air flow of 225 ft/min. Materials evaluated were primarily HT-1 in various weaves and thicknesses, as well as an HT-1 paper and nylon, Dacron, asbestos, and carbon fabrics. The results indicated that a double layer of HT-1 fabric (7.25 ozs / sq yd) was found to provide superior resistance to heat transfer during the 10-second exposure. Triple layer materials provided no additional thermal protection based on the weight of the structures evaluated. These data confirmed previous data obtained from simulated fire tests carried out with complete personnel decelerator systems. Fabrication of 75 personnel decelerator harnesses and packs is being carried out to provide a more extensive evaluation of HT-1 material. (Author)

AD-608 447 Div. 14, 25
OTS Prices: HC $3.00/MF $0.75

California Inst. of Tech., Pasadena.
MULTIAXIAL FAILURE OF VISCOELASTIC MATERIALS.
Interim rept. for 1 Jan-31 Dec 63,
by A. R. Zak. Sep 64, 76p GALCIT-SM-64-6
Contract AF33 616 8399, Proj. 7063, Task 7063 02
ARL 64 144
Unclassified report

Descriptors: (*Isocyanate plastics, Viscoelasticity), (*Viscoelasticity, Isocyanate plastics), (*Failure (Mechanics), Isocyanate plastics), Stresses, Mathematical analysis, Tests, Polymers, Production, Loading (Mechanics), Test methods.

This report contains theoretical and experimental studies related to the failure phenomena in polymeric materials. A new engineering failure theory is developed and described. This theory takes into consideration general, miltiaxial viscoelastic loading conditions. The theory can be used to predict failure under multiaxial stress conditions if the uniaxial viscoelastic failure envelope is known. A viscoelastic stress analysis of the poker-chip specimen is presented. This analysis is needed in order to evaluate the failure data from the triaxial poker-chip test. In the experimental failure studies the Solithane 113 polymer material is being used. The manufacturing process is described in detail. Two types of tests are described; the uniaxial and the triaxial. The uniaxial test is conducted at various constant strain rates and temperatures. The purpose of this test is first to produce data for the viscoelastic characterization of the Solithane 113 material and secondly, to produce uniaxial failure data. The triaxial test uses the poker-chip specimen and its purpose is to generate failure data under triaxial stress conditions. These tests are also conducted at various strain rates and temperatures.

15. Mathematics

AD-608 007 Div. 15
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
REDUCTIONS OF THE HYPERGEOMETRIC FUNCTIONS,
by John T. Robacker. 1956, 31p
Unclassified report

Descriptors: (*Special functions (Mathematical), Theory), Series, Integrals, Reduction, Mathematics.

The main body of this book is devoted to a collection of formulae relating the hypergeometric functions to better known functions. There is an introductory exposition of the theoretical results on hypergeometric functions. Proofs are omitted but reference are supplied for those interested in the proofs. (Author)

AD-608 019 Div. 15, 8
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
ZERO CROSSINGS OF A SINE WAVE PLUS RANDOM NOISE,
by Julius S. Bendat. Dec 56, 42p
Unclassified report

Prepared for presentation at the American Mathematical Society, Seattle, Washington, Aug 20-25, 1956.

Descriptors: (*Stochastic processes, Signal-to-noise ratio), (*Numerical analysis, Polynomials), Analysis of variance, Measure theory, Noise (Radio), Time, Series, Harmonic analysis.

New simple formulas are derived for the expected number of zeros per second of a sine wave process plus normal random noise. The variance in these mean estimates is investigated also. The main difference between this work and a previous study by Rice is that whereas Rice considers a single sine wave of fixed amplitude, phase and frequency, the present formulation allows the sine wave to be a representative member of a 'partially ergodic' stationary random process, an ensemble of records varying in amplitude and phase, fixed in frequency only. This permits a closer agreement than before with many physical problems. The mean value result obtained in this paper agrees with Rice for normal random noise alone; it coincides also with the required identity for sine wave alone. However, in combined situations, the formulas disagree. The variance for random noise by itself is shown to be expressible by a certain integral, and for the special case of normal random noise, the integral is reduced to a form amenable to numerical integration techniques. In cases of a combined sine wave process plus normal random noise, a formula is proposed for finding the variance, and applied to an example of a sine wave plus band limited white noise. (Author)

AD-608 036 Div. 15, 30, 32
OTS Prices: HC $3.00/MF $0.75

Hughes Aircraft Co., Washington, D. C. Technical Analysis Office.
HIERARCHIES OF COMPUTABLE GROUPS AND THE WORD PROBLEM,
by Frank B. Cannonito. Sep 64, 65p TAO-64-1
Contract AF30 602 3339, Proj. 5581, Task 558104
RADC TDR64 274 Unclassified report

Descriptors: (*Automata, Mathematical logic), (*Mathematical logic, Automata), (*Recursive functions, Set theory), Groups (Mathematics), Metamathematics, Mapping (Transformations), Theorems, Communication theory, Information retrieval.

The Grzegorczyk hierarchy was extended to include the (partial) recursive functions, and sets of integers with decision problem restricted to any level of the hierarchy greater than four were constructed. Necessary and sufficient conditions for a finitely generated group to have its word problem solvable by a function at levels of the hierarchy greater than two were determined, and using the previously constructed sets, examples of finitely generated groups with decidable word problem restricted to levels greater than four were constructed. The work concluded with a discussion of eight unsolved problems. (Author)

AD-608 060 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON COMMUTING FUNCTIONS,
by Jon H. Folkman. Nov 64, 18p RM-4342-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Functions, Theory), Real numbers, Sequences, Topology, Functional analysis, Calculus of variations.

There is a rather well-known conjecture that if f and g are continuous functions from (0,1) to (0, 1) which commute (i.e., $f(g(x)) = g(f(x))$), then f and g have a common fixed point. The conjecture is known to be true in some special cases; for example, when f and g are polynomials. H. Cohen has proved the conjecture for the case when f and g have a property he calls fullness. In this memorandum the author generalizes Cohen's theorem to the case when f is full and g is arbitrary. This result is especially interesting because the author assumes a special form for only one of the functions. The methods used seem to be new, and the author feels that further work in this direction may eventually yield a proof of the conjecture in the case when one of the functions is of bounded variation. (Author)

AD-608 063 Div. 15
OTS Prices: HC $1.00/MF $0.50

South Carolina Univ., Columbia.
UNIVERSAL COVERING SPACES AS SPECIAL AND UNIVERSAL SOLUTIONS.
Final rept. for 1 Jun 61-30 Sep 64,
by Johann Sonner. 25 Oct 64, 3p
Grant DA ARO D31 124G310, Projs. 009 925 001, 3099M
AROD 3099 4
Unclassified report

Descriptors: (*Set theory, Groups (Mathematics)), (*Groups (Mathematics), Set theory), Functional analysis, Mapping (Transformations), Topology, Algebra.

During the three contract years the principal investigator studied several problems which, under the influence of category theory, arose from a closer look at universal covering spaces. These included: (a) the foundation problem; (b) the universal covering problem; (c) the adjoint homomorphism problem; (d) the lifting problem and (e) the additivity problem in Abelian categories.

AD-608 099 Div. 15
OTS Prices: HC $3.00/MF $0.75

New York State Univ., Stony Brook. Coll. of Engineering.
THE DISTRIBUTIONAL LAPLACE AND MELLIN TRANSFORMATIONS.
Scientific rept. no. 4,
by A. H. Zemanian. 15 Aug 64, 90p NYSU-CE-26
Contract AF19 628 2981, Proj. 5628, Task 562801
AFCRL 64 685

Unclassified report

Descriptors: (*Integral transforms, Distribution theory), (*Distribution theory, Integral transforms), Transformations (Mathematics), Functional analysis, Real variables, Set theory.

A new method of developing the distributional Laplace and Mellin transformations is devised. It simplifies a number of proofs and derivations for various properties of these transformations and provides greater facility in manipulating specific distributional transforms. (Author)

AD-608 124 Div. 15
OTS Prices: HC $1.00/MF $0.50

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
MULTIPLE COMPARISON TESTS IN MULTIVARIATE CASE,
by P. R. Krishnaiah. Aug 64, 36p
Proj. 7071, Task 7071-01
ARL 64 124

Unclassified report

Descriptors: (*Statistical tests, Statistical analysis), (*Statistical analysis, Statistical tests), Analysis of variance, S-matrix, Statistical distributions, Stochastic processes, Probability.

In this report, various test procedures were considered for the multiple comparisons of mean vectors when the parent populations are assumed to be multivariate normal with a known or unknown covariance matrix. The relative merits of these procedures were also investigated. (Author)

AD-608 158 Div. 15, 2
OTS Prices: HC $1.00/MF $0.50

Michigan State Univ., East Lansing.
MAXIMUM LIKELIHOOD ESTIMATES OF MATRICES OF FINITE RANK.
Scientific rept. no. 2,
by Herman Rubin. 28 Oct 64, 24p RM-119, HR-14
Contract AF19 628 355, Proj. 8624, Task 862402
AFCRL 64 613

Unclassified report

Descriptors: (*Matrix algebra, Probability), (*Probability, Matrix algebra), Iterative methods, Mathematical models, Cloud cover, Programming (Computers), Statistical processes, Perturbation theory.

The main concern of this report was the estimation of a probability matrix of known rank.

AD-608 181 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON SIMULATING CERTAIN RECENT MATHEMATICAL PROBLEMS,
by V. I. Ivanenko. 30 Oct 64, 19p
FTD MT64 264; TT 65 60005

Unclassified report

Edited machine trans. of mono. Vsesoyuznaya Konferentsiya-Seminar po Teorii i Metodam Matematicheskogo Modelirovaniya (All-Union Conference-Seminar on the Theory and Methods of Using Mathematical Models) (no. 2) Moscow, 1961. Trudy, 1962, p. 21-29.

Descriptors: (*Mathematical models, Theory), Simulation, Calculus of variations, Automatic, Control, Servomechanisms, Perturbation theory, Programming (Computers), Digital computers, Analog computers, Boundary value problems, Numerical analysis, USSR.

The topic covered are (1) On one class of variational problems and (2) A method of modeling in a machine complex.

AD-608 224 Div. 15, 9, 5
OTS Prices: HC $1.00/MF $0.50

Maryland Univ., College Park.
FUNDAMENTAL RESEARCH IN APPLIED MATHEMATICS.
Final rept. for 1 Jul 62-30 Jun 64,
by M. H. Martin. Jul 64, 9p
Grant DA ARO D31 124G134, Proj. 407M
AROD 407 67

Unclassified report

Descriptors: (*Scientific research, Mathematics), (*Mathematics, Scientific research), Partial differential equations, Stochastic processes, Boundary value problems, Fluid mechanics, Dynamics, Differential geometry, Queueing theory, Telephone lines.

The research carried out under this grant centered in the main on partial differential equations, with one exception, the work of Visiting Professor Pollaczek. Professor Pollaczek prepared a technical report summarizing his researches on stochastic problems arising in a group of telephone lines. He also lectured on selected topics in analysis, specifically, Legendre polynomials, Ferma's theorem and linear integral equations. The work of other authors dealt with the construction of non-linear boundary problems for non linear partial differential equations for which the solution is unique either unconditionally or under prescribed conditions. More precisely they considered a quasi-linear partial differential equation.

AD-608 270 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MINIMUM CONVEX-COST FLOWS IN NETWORKS,
by T. C. Hu. Nov 64, 23p RM-4265-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Operations research, Costs), (*Numerical methods and procedures, Mathematical programming), Functions, Networks, Optimization, Transportation, Iterative methods, Boundary value problems, Partial differential equations.

An algorithm is given for solving minimum cost flow problems where the shipping cost over an arc is a convex function of the number of units shipped along that arc. This provides a unified way of looking at many seemingly

unrelated problems in different areas. For example, problems associated with electrical networks, with increasing the capacity of a network under a fixed budget, with Laplace equations, and with the Max-Flow Min-Cut Theorem may all be formulated into minimum convex-cost flow problems. (Author)

AD-608 287 Div. 15, 12
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WENGERT'S NUMERICAL METHOD FOR PARTIAL DERIVATIVES, ORBIT DETERMINATION, AND QUASILINEARIZATION,
by R. Bellman, H. Kagiwada, and R. Kalaba.
Nov 64, 14p RM-4354-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Numerical methods and procedures, Partial differential equations), (*Orbital trajectories, Determination), (*Boundary value problems, Numerical analysis), Programming (Computers), Equations, Motion, Functions, Differential equations.

In a recent article R. Wengert suggested a technique for machine evaluation of the partial derivatives of a function given in analytical form. In solving nonlinear boundary-value problems using quasilinearization many partial derivatives must be formed analytically and then evaluated numerically. Wengert's method appears very attractive from the programming viewpoint and permits the treatment of large systems of differential equations which might not otherwise be undertaken. In this memorandum it was shown how to apply the technique to some problems of orbit determination, though the ultimate goal is to handle much more complex problems, such as arise in adaptive control. (Author)

AD-608 292 Div. 15
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif. School of Humanities and Sciences.
NUMERICAL METHODS FOR SOLVING LINEAR LEAST SQUARES PROBLEM. AN ALGOL PROCEDURE FOR FINDING LINEAR LEAST SQUARES SOLUTIONS,
by G. Golub and Peter Businger. 28 Aug 64, 36p
CS-12
Contract Nonr225 37, Proj. NR044 11

Unclassified report

Descriptors: (*Least squares method, Numerical methods and procedures), (*Numerical methods and procedures, Least squares method), (*Programming language, Least squares method), Matrix algebra, Transformations (Mathematics), Programming (Computers).

AD-608 366 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME ASPECTS OF THE RELATIONSHIP OF DYNAMIC PROGRAMMING TO THE CALCULUS OF VARIATIONS,
by Stuart E. Dreyfus. Nov 64, 16p P-3008

Unclassified report

Rept. to be included in a collection of papers presented at the IBM Scientific Computing Symposium on Control Theory and Application, Yorktown Heights, New York, 19 Oct 64.

Descriptors: (*Dynamic programming, Calculus of variations), (*Calculus of variations, Dynamic programming), Control, Theory, Optimization, Equations, Decision theory.

This short paper surveys three aspects of dynamic programming. The first part concerns the salient features of the dynamic programming approach to a problem and relates the formalism to more classical techniques. The second section discusses one area of current dynamic programming research, the mathematical rigorization of the results, and the extension of its domain of proven applicability. The third part illustrates the geometric and intuitive attributes of the dynamic programming formalism by treating, in what is hopefully a straightforward manner, a situation that appears classically to be quite complex. This brief survey does not emphasize what may well be the most important merit of dynamic programming--its easy generalizations to allow the inclusion of the stochastic and adaptive considerations that characterize almost all realistic control problems. (Author)

AD-608 386 Div. 15
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
UTILITY FUNCTIONS AND THE 'lin' OPERATION FOR CONVEX SETS,
by Victor Klee. Oct 64, 17p Boeing-Math-371, D1-82-0381

Unclassified report

Also available from the author.

Descriptors: (*Convex sets, Game theory), (*Game theory, Convex sets), (*Iterative methods, Convex sets), Polynomials, Set theory, Topology, Functional analysis.

This note contributes to utility theory by sharpening a recent example of Kannai (Existence of a Utility in Infinite Dimensional Partially Ordered Spaces) and Perles, and to the geometry of infinite-dimensional convex sets by settling a problem raised in a previous work by the author concerning the iteration of the 'lin' operation. The reduction of the first matter to the second is described. The actual construction appears in section 2. Section 3 mentions two unsolved problems. (Author)

AD-608 396 Div. 15
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
NEARLY MODULAR ORTHOCOMPLEMENTED LATTICES,
by M. Donald MacLaren. Jul 64, 32p
D1-82-0363, Boeing Math-358

Unclassified report

Also available from the author.

Descriptors: (*Algebra, Theorems), (*Set theory, Geometry), Mapping (Transformations), Algebras, Invariance, Algebraic geometry.

Let L be a complete, weakly modular, orthocomplemented lattice. A modular element in L is an element a such that (O, a) is a modular lattice and (x,a) is a modular pair for all x. The lattice L is nearly modular if it is semi-modular and every element in L is the join of modular elements. The following is a key result. Theorem. If L is nearly modular a is a modular element, and b is perspective to a, then b is modular. Using this theorem and

some continuity theorems involving modular elements the following theorems are proved. Theorem. L is nearly modular if an only if L is a locally finite dimension lattice. Theorem. L is semi-modular and contains a minimal element a with central cover 1 if and only if L is a type I dimension lattice. A simple construction, the horizontal sum, is defined and used to show that neither of the conditions in the definition of nearly modular can be dropped. (Author)

AD-608 417 Div. 15, 26
OTS Prices: HC $2.00/MF $0.50

Naval Weapons Evaluation Facility, Albuquerque, N. Mex.
THE TWO-RESPONSE PROBLEM,
by Charles E. Antle. 22 Aug 61, 50p
NAVWEPS 7841

Unclassified report

Descriptors: (*Dynamic programming, Combinatorial analysis), (*Combinatorial analysis, Dynamic programming, Set theory, Convex sets, Optimization, Matrix algebra, Statistical analysis, Manufacturing methods.

Two responses, y sub 1 and y sub 2, are determined by the control values x sub 1, x sub 2, ..., x sub p. It is desirable to achieve high values of y sub 1 and y sub 2 by a choice of the values of the control variables. Usually the values of x sub 1, x sub 2, ..., x sub p that maximize y sub 1 will not maximize y sub 2 so that a compromise will be necessary. The following steps were taken in solving the problem: (1) The complete set of efficient points is defined in such a way that the control variables should always belong to the set. (2) A method for finding the complete set of efficient points is obtained. (3) Help in selecting a particular member from the complete set is given by means of confidence limits on the future responses. (Author)

AD-608 432 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE APPLICATION OF DYNAMIC PROGRAMMING TO THE DETERMINATION OF OPTIMAL PLAY IN CHESS AND CHECKERS,
by Richard Bellman. Nov 64, 7p P-3013

Unclassified report

Paper will be submitted to the Proceedings of the National Academy of Sciences for publication.

Descriptors: (*Digital computers, Dynamic programming), (*Game theory, Programming (Computers)), (*Dynamic programming, Game theory), Recussive functions, Equations, Boundary value problems, Functions, Decision theory.

A great deal of effort has been expended in connection with the use of digital computers to play chess and checkers. The most successful has been the checker-playing program of Samuel. It is of some interest then to indicate how the theory of dynamic programming can be used to determine optimal play in the great majority of Pawn-King end-games in Chess, with computers currently available, and in all probability, to determine optimal play for the entire game of checkers. The basic methods are outlined involving as they do the concept of semigroups in structure.

16. Medical Sciences

AD-608 044 Div. 16, 20
OTS Prices: HC $1.00/MF $0.50

Air Force Weapons Lab., Kirtland AFB, N. Mex.
THE EFFECTIVE HALF LIFE OF Zn65 IN BEAGLE DOGS,
by Merton A. Quaife, Lawrence T. Odland, and George Kennedy. Oct 64, 23p
Proj. 7801
WL TDR64 61

Unclassified report

Descriptors: (*Zinc, Half life), (*Labeled substances, Zinc), (*Dogs, Tracer studies), Body weight, Radioactive isotopes, Metabolism, Effectiveness, Injection (Medicine), Counting methods, Correlation techniques, Measurement.

The effective half life of zinc65 was determined in five male beagle dogs following intravenous injection of the radioisotope. Whole-body counting techniques were utilized to measure the amount of Zn65 retained with reference to time. Individual effective half lives are graphically depicted. The mean effective half life of Zn65 was found to be 626±133 hours. A correlation was noted between body weight and magnitude of the half life. (Author)

AD-608 088 Div. 16, 29
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Philadelphia, Pa.
EMERGENCY BREATHING AND SUIT PRESSURIZATION SYSTEM.
Final rept. for 31 May 63-31 Mar 64,
by R. A. Miller and D. J. Withey. Sep 64, 47p
Contract AF33 657 11345, Proj. 6373, Task 637305
AMRL TDR64 60

Unclassified report

Descriptors: (*Life support, Respiration), (*Respiration, Life support), (*Pressure suits, Respiration), (*Pressure suits, Respiration), (*Pressure breathing, Astronauts), Closed ecological systems, Carbon dioxide, Oxygen, Ventillation, Humidity, Heat exchangers, Temperature, Control systems, Flight clothing, Equations.

The design and fabrication of an Emergency Breathing and Suit Pressurization System (EBSPS), capable of sustaining three full-pressure suited crewmen within the Aerospace Medical Research Laboratories Life Support System Evaluator, has been investigated. Two operating modes are provided. One, when the Evaluator is pressurized, the Emergency Breathing and Suit Pressurization System operates as an openloop system and ventilates the pressure suit with the ambient air. Two, when the Evaluator is depressurized, the Emergency Breathing and Suit Pressurization System operates as a closed environmental control system, and provides the crewmen with a habitable atmosphere. In this latter mode, the system regulates the suit pressure, the CO2 partial pressure, relative humidity, composition (100% O2), and temperature of the ventilating air, and supplies oxygen for breathing and leakage make up as required. In all modes, the Emergency Breathing and Suit Pressurization System regulates the flow of ventilating atmosphere through the pressure suits. (Author)

AD-608 089 Div. 16
OTS Prices: HC $2.00/MF $0.50

California Univ., Los Angeles.
BEHAVIORAL AND NEUROPHYSIOLOGICAL STUDIES OF UDMH IN THE CAT.
Final rept. for May 62-Jul 64,
by M. D. Fairchild and M. B. Sterman. Sep 64, 33p
Grant DA CML18 108G51, Proj. 6302, Task 630202
AMRL TDR64 72

Unclassified report

Descriptors: (*Toxic tolerances, Dimethyl hydrazine (1-1)), (*Dimethyl hydrazine (1-1), Toxic tolerances), Behavior, Nervous system, Physiology, Poisoning, Convulsive disorders, Central nervous system, Brain, Cerebral cortex, Electroencephalography, Injection (Medicine), Dosage, Toxicity, Cats.

Studies concerning the behavioral and neurophysiological actions of UDMH in cats were carried out employing three separate experimental approaches: (a) Collection of behavioral and electrophysiological data from animals prepared with indwelling recording electrodes and isolated in a controlled environment after various doses of UDMH, (b) Determination of thresholds for seizure induction by electrical stimulation of the hippocampus in unanesthetized, but immobilized acute preparations, and (c) Development of a unique behavioral apparatus which provides for the evaluation of subconvulsive doses of UDMH in relation to specific CNS regulatory mechanisms. The latter experiment has not yet reached the stage of UDMH administration and testing. The first set of experiments disclosed a direct relationship between dose and time of onset of characteristic behavioral and EEG signs preceding convulsions. The acute experiments indicate an initial increase in ventral hippocampal seizure threshold after administration of low doses of UDMH. This change is seen for the first two hours post-injection and may be related to the initial lethargy and delay in seizure occurrence characteristic of UDMH exposure. (Author)

AD-608 115 Div. 16, 4
OTS Prices: HC $2.00/MF $0.50

New York State Univ., Stony Brook. Coll. of Engineering.
A NONLINEAR MODEL FOR TEMPLET REGULATED PROTEIN SYNTHESIS,
by I. Gerst and S. N. Levine. 1964, 30p
Contract Nonr4006 00, Grant AF AFOSR667 64

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Proteins, Synthesis (Chemistry)), (*Amino acides, Polymerization), Peptides, Ribosomes, Ribonucleic acids, Transferases, Complex compounds, Metabolism, Mathematical models, Nonlinear differential equations, Integral transforms, Polynomials, Reaction kinetics.

A mathematical model of biological polymerization reactions is formulated and applied to protein synthesis. Under certain reasonable assumptions, including that of a nondisassociated enzyme templet complex, the resulting set of first order nonlinear differential equations were solved by integral transform techniques. The case where the enzyme templet complex cisassociates is also treated by perturbation techniques. The results indicate that the synthesis can be regarded as consisting of three stages (assuming constant monomer concentration): (a) an initial stage in which the concentration of protein is given by Ct to the 2N + 1 power (where N is the degree of polymerization and t, time) and therefore representing a lag phase; (b) an intermediate stage in which the protein concentration is determined by an exponential polynomial; (c) a third state of a linear increase in protein concentration with time. Methods are also described for determining

the rate constants, associated with the polymerization, from the in vitro kinetic data. This important result should facilitate the kinetic analysis of peptide synthesis. (Author)

AD-608 139 Div. 16
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
RESPIRATORY AND MICROCLIMATE TEMPERATURES WITHIN THE PARKA HOOD IN EXTREME COLD.
Final rept.,
by James H. Veghte. Sep 64, 15p
Proj. 7164, Task 716409
AMRL TDR64 79 Unclassified report

Descriptors: (*Protective clothing, Cold weather tests), (*Respiration, Cold weather tests), (*Frostbite, Cold weather tests), Head, Nose, Face, Polar regions, Arctic regions, Exposure, Exercise, Relaxation, Air, Temperature, Temperature sensitive elements, Thermocouples, Air force personnel.

The standard Air Force arctic clothing was worn to determine if it provided adequate head protection in extremely cold temperatures. Subjects were exposed to -62C for 40 to 50 minutes in an environmental chamber. Possible respiratory problems and frostbite of the cheeks and nose were the primary concern. Subjects resting or exercising experienced no respiratory or frostbite problems. Air in the hood rapidly approached ambient conditions, because of the expulsive nature of expiration and the strong convective air movement. Exercise increased the microclimate temperatures in the hood. The existing hood design was found to provide adequate head protection for AF personnel at more extreme temperatures than are normally encountered in the Arctic. (Author)

AD-608 156 Div. 16, 15, 30
OTS Prices: HC $1.00/MF $0.50

Chicago Univ., Ill.
AN ANALOG COMPUTER MECHANIZATION OF THE HODGKIN-HUXLEY EQUATIONS,
by Hugo M. Martinez and H. D. Landahl. 1 Oct 64, 25p
Grant AF AFOSR370 63, PHS CA06475 03
Unclassified report

Rept. on Application of Information Theory to the Nervous System.

Descriptors: (*Nerve cells, Potential theory), (*Membranes (Biology), Potential theory), (*Mathematical models, Nervous system), Stimulation, Simulation, Electric currents, Thresholds (Physiology), Potassium, Sodium, Analog computers, Communication theory, Differential equations.

The Hodgkin-Huxley equations describing the action potentials for giant squid axons have been mechanized on the University of Chicago analog computer (Beekman EASE 2132) for the purpose of simulating a variety of experimental situations. The mechanization is described together with the following results: 1) response to constant currents ranging from threshold to saturation, 2) response to a 100 cps sinusoidal current at two amplitudes and two phases, and 3) the effect of removing the potassium current term. (Author)

AD-608 171 Div. 16
OTS Prices: HC $1.00/MF $0.50

Washington Univ., Seattle. School of Medicine.
TRACHOMA VIRUS RESEARCH.
Annual scientific rept.,
by H. M. Jenkin. 30 Oct 64, 4p
Grant Nonr G00034 64, Proj. NR105 322
Unclassified report

Descriptors: (*Viruses, Medical research), Diseases, Immunology, Growth, Embryonated egg technique, Biochemistry, Labelled substances, Arboviruses, Influenza virus, Miyagawanella Louisianae, Pathology, Lipids, Phospholipids, Chromatographic analysis.

The dynamics of growth, immunological and chemical characterization of PLT agents were studied using cell culture, biochemical, immunological and radioisotope tools. This work was not confined to the PLT agents. PPLO and viruses such as influenza and arboviruses were also under investigation. An abstract of results of continuous passage of trachoma in HeLa cells has been published (Jenkin and O'Donnell, 1963). Recently 47 and 53 cell culture passage of trachoma strains, TW3 and Bour, respectively, showed continued pathogenicity in monkey eyes. The lack of second cycles of growth of trachoma in the HeLa cell system seems associated with interferon production. In this laboratory trachoma does not produce a CPE in HeLa cells permitting the use of Chikungunya, a group A arbovirus which does cause a CPE, as a challenge organism for detection of interferon. Lipid analysis of host (chick allantoic fluid - 'L' cells) and purified PLT organisms (6BC and meningopneumonitis virus) using thin layer and gas chromatography techniques showed quantitative and qualitative differences in the phospholipid fractions between the host and parasite as well as between parasite strains. Gas chromatography and thin layer chromatography analysis of fatty acids of phospholipid species of different strains of PLT is under investigation. (Author)

AD-608 210 Div. 16
OTS Prices: HC $1.00/MF $0.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
HUMAN ENTERIC PATHOGENS IN DOGS IN CENTRAL ALASKA,
by C. E. Butler and B. R. Herd. Sep 64, 14p
Proj. 8241, Task 824101
AAL TDR64 10
Unclassified report

Descriptors: (*Public health, Alaska), (*Disease vectors, Dogs), (*Salmonella, Disease vectors), Pathology, Microorganisms, Shigella, Intestines, Humans, Diseases, Epidemiology.

A 12-month's study in Central Alaska shows that family pets are harboring a singificant quantity of human intestinal pathogens. While previous investigators in Alaska have found up to 7% of the dogs harboring either Salmonella or Shigella, this study found approximately 18% harboring these plus an additional 9% harboring related, potentially pathogenic organisms. In addition, the study shows that dogs in the area (1) can harbor multiple species of Salmonella at one time, (2) appear to act as transient carriers, and (3) do not necessarily show signs of intestinal infection when the organisms are present. The organisms were found in the animals throughout the year. As a result of the long severe winter, the family pet usually lives in close proximity to human friends; thus it becomes a potential vector of some significance. (Author)

AD-608 211 Div. 16
OTS Prices: HC $2.00/MF $0.50

American Foundation for Biological Research, Madison, Wis.
DIRECT OBSERVATIONS ON THE MODE OF INVASION

OF LIVING TISSUES BY ICE. PART I. THE MODE OF PROPAGATION OF ICE IN THE COURSE OF FREEZING OF LIVING TISSUES. PART II. BEHAVIOR OF CELLS UPON ENCOUNTER WITH INVADING ICE DURING FREEZING OF LIVING TISSUES.
by B. J. Luyet, R. J. Williams, and P. M. Gehenio.
Aug 64, 32p
Contract AF41 657 343, Proj. 8241, Task 824102
AAL TDR63 26

Unclassified report

Descriptors: (*Tissues (Biology), Freezing), (*Freezing, Tissues (Biology), (*Cells (Biology), Freezing), Frogs, Membranes (Biology), Lungs, Heart, Muscles, Ice, Low-temperature research, Erythrocytes, Dehydration, Osmosis, Reticulo-endothelial system , Blood vessels, Recrystallization, Photographs, Histological techniques.

Direct observations, during freezing, of pieces of frog tissues or organs (mesentery, nictitating membrane, lung, pericardium and muscle) were made by means of the apparatus for cryomicroscopy. Three stages in the ice invasion of tissues were noted: (1) Superficial freezing: at high subzero temperatures, a flimsy blanket of ice spread over and underneath the thin layer of tissue. (2) Intercellular freezing: at slightly lower temperatures, ice from the superficial layer was seen to spread between the cells, the advancing ice front sometimes using tissue elements, like bundles of collagenous fibers, as pathways. (3) Intracellular freezing: at still lower temperatures, ice entered the cells; the red blood cells were seen to freeze individually. Shrinkage by osmotic dehydration, in extracellular freezing, was observed in erythrocytes, macrophages and muscle fibers. Ciliary activity (on peritoneum), which was not irreversibly affected by extracellular freezing, was never resumed after intracellular freezing. (Author)

AD-608 212 Div. 16
OTS Prices: HC $1.00/MF $0.50

Albert Einstein Medical Center, Philadelphia, Pa.
METABOLIC AND FUNCTIONAL CHANGES IN THE HEART DURING PROLONGED HYPOTHERMIA,
by C. Russ and J. C. Lee. Sep 64, 14p
Contract AF41 657 417, Proj. 8237, Task 823703
AAL TDR64 4

Unclassified report

Descriptors: (*Hypothermia, Heart), (*Heart, Hypothermia), (*Metabolism, Heart), Dogs, Anesthesia, Blood circulation, Oxygen, Body temperature, Glycolysis, Pyruvates, Carbohydrates, Lactates, Fatty acids, Hypoxia, Tolerances (Physiology), Blood vessels, Cooling.

The effect of hypothermia of 25C for 24 hours on myocardial metabolism and efficiency was determined on dogs fasted for approximately 15 hours and anesthetized with sodium pentobarbital. Coronary blood flow, cardiac output, myocardial oxygen and substrate utilization, and mechanical efficiency of the heart were determined at normal and reduced body temperatures. Prolonged reduction of myocardial temperature, with concomitant reduction in coronary blood flow, led to diminished oxygen and substrate utilization. Myocardial glycolysis began following 12 hours of cooling when pyruvate utilization stopped in negative balance. After 24 hours the heart stopped utilizing carbohydrates, with negative arteriovenous differences for these substrates (in the presence of normal arterial carbohydrate levels), but continued to utilize nonesterified fatty acid. The coefficient of oxygen utilization for the heart increased following 24 hours of cooling, suggesting a relative state of myocardial hypoxia. The appearance of hypoxia and glycolysis during the late hours of cooling suggest that the heart's limit of tolerance to cooling was near. (Author)

AD-608 236 Div. 16
OTS Prices: HC $10.55/MF $3.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TRANSACTIONS OF THE INSTITUTE OF GENETICS, ACADEMY OF SCIENCES USSR, 1962, VOL. 29.
14 Aug 64, 754p
FTD TT63 662; TT 65 60014

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Institut Genetiki. Trudy, 1962, v. 29, p. 5-471. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Genetics, Scientific research), (*Agriculture, Scientific research), Plants (Biology), Viruses, Yeasts, Wheat, Animals, Food, Vegetables, Radiation effects, Cytology, Soils, USSR, Biology.

The document contains articles of agricultural and biological interest with emphasis on genetic aspects. Several articles on the effects of radiation upon plants are included.

AD-608 293 Div. 16, 32
OTS Prices: HC $5.00/MF $1.00

Federation Dentaire Internationale, London (England). Commission on Dental Research.
EUROPEAN DENTAL RESEARCH DIRECTORY.
Edition no. 3.
1964, 166p
ONRL D9

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Dentistry, Medical research), (*Directories, Dentistry), (*Dental personnel, Directories), Indexes, Great Britain, Europe, Universities.

A compilation is given of European institutions and personnel engaged in dental research. An index by research fields is included.

AD-608 360 Div. 16, 4
OTS Prices: HC $3.00/MF $0.75

Hine Labs., Inc., San Francisco, Calif.
TOXICOLOGIC EVALUATIONS OF HEXANITROETHANE.
Final rept.
1 Dec 61, 72p

Unclassified report

Descriptors: (*Organic nitrogen compounds, Toxicity), Stress (Physiology), Sensory mechanisms, Toxic tolerances, Handling, Vapors, Pathology, Laboratory animals, Humans.

The evaluation of the toxicity of Hexanitroethane was carried out through a series of sutudies including repeated vapor exposures to three air levels of four species of animals, short term exposures to saturated vapors, repeated application to the skin of rabbits and sensory responses of human volunteers. Evidence of toxicity as reflected by mortality and decreased weight gain was present in all species exposed repeatedly at levels of 3.0 ppm in the ambient air. Some evidence of physiological stress appeared in all species exposed to 1.0 ppm. Sensory threshold studies were conducted which indicated that eye irritation was a significant warning sign of undesirable concentrations. A suggested maximal allowable concentration in the air based on the above studies would be 0.1 ppm.

In the absence of adequate ventilation to achieve this level, protective respiratory devices would be required for safe handling. (Author)

AD-608 399 Div. 16, 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CHEMOTHERAPY, CONVOLUTION EQUATIONS, AND DIFFERENTIAL APPROXIMATION,
by Richard Bellman and Bella Kotkin. Nov 64, 14p P-3005
Grant NIH GM09608 03

Unclassified report

Paper presented at the Second Annual Symposium in Biomathematics and Computer Sciences in the Life Sciences, Houston, Texas, May 1964.
See also AD-410 861.

Descriptors: (*Cancer, Chemotherapy), (*Chemotherapy, Mathematical models), (*Mathematical models, Chemotherapy), Chemotherapeutic agents, Blood circulation, Biochemistry, Medical research, Numerical analysis, Differential equations, Difference equations, Time-lag theory, Iterative methods.

A review is given of attempts at developing mathematical techniques for use in digital computer programs applicable to a problem of cancer chemotherapy, that of injecting a chemical agent into the blood stream and determining the time course of the concentrations of the drug and the compounds formed in the organs. In an early model two organs were linked in parallel to the circulation, with the heart acting as a mixing pot. Since only the drug concentrations entering and leaving the capillary bed were measurable, they were replaced by ordinary differential equations, and the capillary bed was regarded as a series of mixing chambers with instantaneous uniform mixing. An iterative scheme was evolved whereby a differential-difference equation is replaced by a series of ordinary differential equations defined over the initial interval lag in time for injection of a drug by the blood, and where the number of equations depends on the range of integration. Techniques were also worked out for a two-organ model with the assumption of laminar flow and mixing in the large blood vessels.

AD-608 434 Div. 16
OTS Prices: HC $1.00/MF $0.50

New York State Univ., Buffalo. School of Medicine.
NEUROLOGIC HAZARDS OF DIVING.
Technical rept. no. 64-1,
by H. W. Gillen and Edward J. Meyer. 23 Apr 63, 18p
Contract Nonr969 04

Unclassified report

Preliminary presentation was given at the Annual Meeting of the International College of Surgeons, April 23, 1963, Los Angeles.

Descriptors: (*Nervous system, Barametric pressure), (*Diving, Hazards), Nuerology, Pathology, Respiration, Compressed air, Decompression sickness, Tissues (Biology), Blood chemistry, Carbon dioxide, Oxygen consumption, Embolism, Lungs, Brain, Electroencephalography, Convulsive disorders, Drowning, Aquatic animals, Toxicity, Underwater clothing, Protective clothing, Safety.

Diving is hazardous. Both the water and the increased pressure present hazards to the nervous system. Some of the neurologic manifestations of decompression sickness--air embolism, inert gas narcosis, and oxygen toxicity--have been described. A few of the marine life hazards have been mentioned that are toxic to the nervous system. Careful diving technic combined with knowledge of the potential sources of danger should permit safe diving without embarrassment to the nervous system. Carelessness in diving is fraught with danger. (Author)

AD-608 459 Div. 16
OTS Prices: HC $10.85/MF $3.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OXYGEN INSUFFICIENCY: HYPOXIA AND ADAPTATION TO IT,
ed. by A. F. Makarchenko. 24 Nov 64, 781p
FTD TT64 878; TT 65 60124

Unclassified report

Unedited rough draft trans. of mono. Kislorodnaya Nedostatochnost': Gipoksiya i Adaptatsiya k Nei, Kiev, 1963, 610p.

Descriptors: (*Hypoxia, Adaptation (Physiology)), Acclimatization, Vertebrates, Electrocardiography, Hemopoietic system, Aging (Physiology), Oxygen consumption, Carbon dioxide, Cardiovascular diseases, Central nervous system, Pathology, Tissues (Biology), Respiration, Brain, Blood chemistry, Barometric pressure, Blood vessels, Metabolism, Hormones, Enzymes, Acceleration, Vibration, Biochemistry, Vitamins, Cells (Biology), Radiation sickness, Electrolytes (Physiology), Blood pressure, Blood count, Mental disorders, USSR.

Research results obtained in the foremost laboratories of the Soviet Union working on the problem of hypoxia and adaptation of the organism to it are presented. Questions of the comparative physiology of adaptation and acclimatization of the organism to the high-mountain climate are illuminated, contemporary concepts of the significance of the cell chemical mechanism in the process of adaptation to hypoxia are set forth, and data are presented on the importance of hypoxemia in the pathology of the childhood years and the role of the age factor in the reaction of the organism to hypoxia. New facts are also communicated concerning the influence of hypoxia on the propagation of stimuli in the motor regions of the brain, on the influence that it exerts on bioelectric activity, oxygen partial pressure and the energy indicators of the cerebral cortex and subcortical formations. The problem of regional oxygen insufficiency and the importance of this problem in the development of myocardial infarct are examined. Light is also cast on the problems of oxygen starvation and the mechanisms that compensate it in heart failure. The question of foundations for the diagnosis of hypoxic states is raised. (Author)

AD-608 460 Div. 16
OTS Prices: HC $7.40/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MOLECULAR GENETICS AND THE EFFECTS OF RADIATION ON HEREDITY,
by N. P. Dubinin. 2 Jun 64, 436p
FTD TT63 1214; TT 65 60125

Unclassified report

Unedited rough draft trans. of mono. Molekulyarnaya Genetika i Deistvie Izluchenii na Nasledstvennost', Moscow, 1963, 239p.

Descriptors: (*Genetics, Scientific research), (*Radiation effects, Genetics), Cells (Biology), Molecular structure, Nucleic acids, Proteins,

Biochemistry, Bacteria, Viruses, Desoxyribonucleic acids, Biosynthesis, Reproduction (Physiology), Amino acids, Enzymes, Antigens and antibodies, Ionization, Dose rate, Mutations.

Current research on the most profound and exciting problems of molecular genetics, such as the physical and chemical bases of heredity, the deciphering of the genetic code, the molecular bases of protein synthesis, the control of heredity, and the influence of radiation on human heredity, are discussed. This report will be of value to a wide range of readers interested in the current state of the life sciences and the influence of radiation on heredity. A large number of illustrations are included.

AD-608 463 Div. 16, 25
OTS Prices: HC $5.00/MF $1.00

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
A MATHEMATICAL MODEL OF THE HUMAN BODY.
Final rept. for Jun 63-Aug 64,
by Ernest P. Hanavan, Jr. Oct 64, 162p
Proj. 7184, Task 718405
AMRL TR64 102; AFIT GA/PHYS/64 3
Unclassified report

Thesis in partial fulfillment of MS degree in Engineering, USAF Inst. of Tech., Wright-Patterson AFB, Ohio.

Descriptors: (*Mathematical models, Body), (*Body, Moment of inertia), (*Moment of inertia, Body), Humans, Biophysics, Anthropometry, Gravity, Center of mass, Center of Gravity, Body weight, Distribution, Euler's angle, Programming (Computers), Programming languages, Digital computers, Design.

A mathematical model for predicting the inertial properties of a human body in various positions was developed. Twenty-five standard anthropometric dimensions are used in the model to predict an individual's center of gravity, moments and products of inertia, principal moments, and principal axes. The validity of the model was tested by comparing its predictions with experimental data from 66 subjects. The center of gravity was generally predicted within 0.7 inches and moments of inertia within 10 percent. The principal vertical axis was found to deviate from the longitudinal axis of the body by as much as 50 degrees, depending on the body position assumed. A generalized computer program to calculate the inertial properties of a subject in any body position is presented. The inertial properties of five composite subjects in each of 31 body positions is offered as a design guide. IBM 7094 digital computer programs are appended. (Author)

17. Metallurgy

AD-608 001 Div. 17
OTS Prices: HC $4.00/MF $1.00

Electrochemistry Lab., Univ. of Pennsylvania, Philadelphia.
HYDROGEN EVOLUTION: THE EFFECT OF SURFACE CONCENTRATION.
Final rept,
by J. O'M. Bockris. 31 Mar 62, 135p
Contract Nonr551 22, Proj. NR036 028
PB 163 804

Unclassified report

Descriptors: (*Hydrogen embrittlement, Metals), (*Metals, Corrosion), (*Corrosive gases, Hydrogen), Surfaces, Production, Absorption, Electrodes, Films, Silver, Nickel, Copper, Iron, Membranes, Electrochemistry.

It is shown that the mechanism of the mechanism of the hydrogen evolution reaction is rate-determining discharge followed by Tafel recombination at low overpotential, and electrochemical desorption at high overpotentials (> 600 mv). These conclusions are also in harmony with the findings of Frumkin (1957), who used a qualitative method of establishing the mechanism, by observing the increase or decrease of overpotential at constant current when additional amounts of hydrogen are introduced by permeation.

AD-608 041 Div. 17, 25
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ., Columbus. Research Foundation.
PROPERTIES OF ELECTRONIC AND MAGNETIC MATERIALS AT CRYOGENIC TEMPERATURES.
Topical rept. for 1 Apr 63-1 Jan 64,
by J. G. Daunt. Sep 64, 12p
Contract AF33 657 10844, Proj. 7367, Task 736703
ML TDR64 176

Unclassified report

Descriptors: (*Molybdenum alloys, Cryogenics), (*Rhenium alloys, Cryogenics), (*Cryogenics, Molybdenum alloys), Resistance (Electrical), Thermal conductivity, Magnetic fields, Superconductivity, Wire.

The work reported herewith constitutes the initial stage of a program of investigation of the electrical, thermal, and magnetic behavior of Mo-Re alloys in their superconducting and normal states. This work covers data obtained on the electrical resistivity and thermal conductivity of Mo-Re (50% Re) wires as a function of magnetic fields at liquid helium temperatures. The magnetic fields used had intensities up to 50 kilogauss, produced by a superconducting solenoid. The work is being continued and extended to other properties and other Mo-Re samples in various physical states. (Author)

AD-608 076 Div. 17
OTS Prices: HC $7.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ROENTGENOGRAPHY,
by G. F. Kosolapov. 31 Aug 64, 316p
FTD MT63 261; TT 64 71687

Unclassified report

Edited machine trans. of mono. Rentgenografiya, Moscow, 1962, 332p.

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*X-ray photography, Metals), (*X-ray diffraction analysis, Metals), (*X-ray absorption analysis, Metals), Textbooks, X-rays, X-ray tubes, Crystallography, Structural properties, Phase studies, Deformation, Stresses, Heat treatment, Steel, Solid solutions, Liquid metals, Fractography, Electron diffraction analysis, Neutron diffraction analysis, Alloys.

CONTENTS:
Spectra of X-rays; Equipment used in X-ray analysis; Elements of crystallography; Interference of X-rays; Fundamental methods of investigation of structure; Study of phase diagrams of alloys by X-ray analysis; Structure of plastically deformed and recrystallized metal; Determination of residual stresses by X-ray method; X-ray analysis of heat-treated steel; X-ray analysis of supersaturated solid solutions (Aging of alloys); X-ray analysis of structure of liquid metals; X-ray flaw detection; Electron diffraction and neutron diffraction.

AD-608 082 Div. 17
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEWS OF SCHOOLS OF HIGHER EDUCATION. NONFERROUS METALLURGY, 1963, VOL. 6, NO. 6.
31 Aug 64, 227p
FTD MT64 172; TT 64 71680

Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Tsvetnaya Metallurgiya (USSR) 1963, v. 6, no. 6, p. 1-166.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Metallurgy, Scientific research), Mining engineering, Lead, Zinc, Ores (Metal sources), Ventilation, Flotation, Separation, Viscosity, Copper, Reaction kinetics, Thermodynamics, Antimony, Aluminum, Electrolytes, Refractory metals, Chlorides, Titanium compounds, Zirconium compounds, Molybdenum, Tungsten, Rhenium, Iron, Barium compounds, Calcium, Zone melting, Tungsten alloys, Rhenium alloys, Aluminum alloys, Copper alloys, Brass, Material forming.

Contents: Causes of change in lead and zinc content at Sadonskoye deposit; Ways of regeneration of system of layer cave-in; Flotation activity of mineral particles; A method of calculating hydrocyclone efficiency; Equation for the viscosity of molten media as a function of temperature; Kinetics of bornite dissolution; Investigation of the thermodynamic properties of a Cu-Sb bimetallic system by the EMF method; Electrical conductivity of industrial aluminum-bath electrolyte with additions of MgF2 and NaCl; Equilibrium between molybdenum and its ions in molten potassium chloride; Determination of the surface tension of tungsten, molybdenum, and rhenium; Purifying barium compounds of calcium impurities by zone melting; Electrolytic etching and polishing of a tungsten-rhenium alloy; Influence of solution decomposition on the recrystallization of Al-Cu alloys; Influence of temperatures and rate of deformation on the mechanical properties of L62 Brass.

AD-608 110 Div. 17, 14, 32
OTS Prices: HC $3.00/MF $0.75

Defense Metals Information Center, Columbus, Ohio.

DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Mary F. Banks. Oct 64, 68p
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Bibliographies, Metallurgy), (*Alloys, Bibliographies), (*Metals, Bibliographies), (*Refractory metals, Bibliographies), Indexes, Abstracting, Tensile properties, Cobalt alloys, Nickel alloys, Steel, Stainless steel, Iron alloys, Beryllium, Titanium, Magnesium, Aluminum, Carbon, Graphite, Refractory materials, Ceramic materials, Oxides, Niobium, Chromium, Molybdenum, Rhenium, Tantalum, Vanadium, Tungsten, Platinum, Coatings, Composite materials.

Contents: High-strength alloys, light metals, nonmetallics, refractory metals, and miscellaneous materials.

AD-608 121 Div. 17, 4
OTS Prices: HC $2.00/MF $0.50

McMaster Univ., Hamilton (Ontario).
THE ACTION OF ADSORPTIVE INHIBITORS IN SOME CORROSIVE SYSTEMS.
Technical rept. no. 4,
by M. B. Ives. Oct 64, 34p
Contract Nonr3925 00

Unclassified report

Prepared for presentation at the Chemical Engineering Conference (14th) of the Canadian Institute of Chemistry. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Corrosive liquids, Adsorption), (*Antioxidants, Tracer studies), Corrosion inhibition, Thermochemistry, Iron, Lithium compounds, Fluorides, Iron compounds, Chlorides, Crystal structure, Etched crystals, Crystal lattice defects.

A review is made of the proposed mechanics of adsorptive inhibitors on crystalline surfaces, as substantiated by experimental activity in recent years. In particular, detailed consideration is given to the profound effects that can be wrought by small quantities (ppm) of suitable ions in aqueous solution on the dissolution of alkali halide crystals. Radio-tracer experiments were performed in order to deduce adsorption isotherms for iron adsorbed on lithium fluoride surfaces from dilute solutions of ferric chloride. The results support the concept of inhibitor control by action at the 'kink' sites in an otherwise close-packed crystal surface, and the etch morphologies obtained may be successfully related to such a concept. It is proposed that the theories may be extrapolated to cases of metallic corrosion controlled by inhibitors which act by means other than the creation of a continuous 'passive' film. (Author)

AD-608 142 Div. 17, 14, 26
OTS Prices: HC $2.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
AN INTRODUCTION TO MAGNESIUM ALLOYS,
by John B. Hallowell and H.R. Ogden. 26 Aug 64,
27p DMIC-206
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Magnesium alloys, Metallurgy), Aluminum alloys, Rare earth elements, Alloys, Thorium alloys, Zirconium alloys, Manganese alloys, Lithium alloys, Silver alloys, Zinc alloys, Chemical analysis, Material forming, Joining, Phase studies, Machining, Finishes and finishing, Physical properties, Heat treatment.

This report describes the characteristics and properties of existing commercial magnesium alloys and compares these relative to each other. Although this report is not intended to serve as a source of design data for magnesium alloys, it was written to provide a simple,up-to-date background of information for the technologist who is faced with the problem of materials selection and who is unfamiliar with the advantages and disadvantages of magnesium alloys. The eight major alloying elements which are used to control the properties of magnesium are listed along with selected data illustrating the binary phase relationships which exist, between the hexagonal, close-packed structure of magnesium and each of these metals. The nomenclature system for commercial magnesium alloys is explained and compositions and available forms of the alloys are given. Property comparisons of both cast and wrought alloys are presented. There is a section in the report dealing with the joining, forming, and machining of magnesium, and a section devoted to a discussion of a number of finishing systems which have been developed for magnesium alloys. (Author)

AD-608 146 Div. 17, 26
OTS Prices: HC $1.00/MF $0.50

Materials Research Lab., Inc., Richton Park, Ill.
THE USE OF STRAIN SOFTENING TO IMPROVE THE PROPERTIES OF REFRACTORY METALS.
Quarterly progress rept. no. 3, 1 Jun-31 Aug 64,
by E. J. Ripling and S. Zager. 31 Aug 64, 10p
Contract NOw64 0247c

Unclassified report

Descriptors: (*Refractory metal alloys, Ductility), (*Molybdenum alloys, Ductility), (*Mechanical working, Molybdenum alloys), (*Ductility, Molybdenum alloys), Titanium alloys, Surfaces, Deformation, Transition temperature, Strain (Mechanics), Electrolytic polishing, Machining.

During the present report period, attempts were made to reduce the scatter in both as-received and flexed Mo-0.5 Ti by two different surface treatments, viz., electropolishing and mechanical grinding. Neither of these were effective in reducing the scatter, however, implying that scatter results from a random internal distribution of flaws. Surface notches were applied to the bend test samples in order to introduce a flaw larger than the random ones occurring in the plate. This decreased the amount of scatter, but probably more important, the ductility at all testing temperatures was lowered so that a comparison of the flexed and as-received material was no longer limited by the angle of the punch. The introduction of the mild surface notch elevated the transition temperature 200-300F. Flexing Mo-0.5 Ti plates was found to approximately double their notch bend ductility in both the longitudinal and transverse direction over much of the range of testing temperatures. (Author)

AD-608 163 Div. 17, 26
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
TENSILE STRENGTH-HARDNESS RELATIONSHIPS IN THERMOMECHANICALLY TREATED STEELS,
by Eric B. Kula and Albert A. Anctil. Aug 64, 29p
Proj. 1A024401A11002
AMRA TR64 23

Unclassified report

Descriptors: (*Steel, Mechanical properties), Tensile properties, Hardness, Heat treatment, Cold working,

Martensite, Austenite, Aging (Materials), Stainless steel, Carbon alloys, Alloys, Hardening.

Data have been assembled from various sources on the strength and hardness of a number of steels after various thermomechanical treatments. These processes include the following types: I. martensite formed from cold-worked austenite; II. martensite formed directly during the cold working of austenite; and III. martensite or other transformation products of austenite cold worked and aged. Steels represented include various carbon and alloy steels as well as stainless steels. The published ASTM tensile strength-hardness correlation adequately describes the data for the standard quenched and tempered condition. The data for Type I thermomechanical treatment also follow this relation, although with somewhat greater scatter. For cold-worked martensite, Type III, the tensile strength is generally higher than would be predicted from the ASTM curve, and the magnitude of this deviation increases with increasing amounts of cold working of the martensite. Type II treatments occupy an intermediate position. Utilizing the known effect of thermomechanical treatments on strain-hardening properties, it is possible to extend Tabor's analysis of the tensile strength-hardness correlation to explain the behavior of thermomechanically treated steels. (Author)

AD-608 164 Div. 17
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
EVALUATION OF REFRACTORY METAL SHEET ALLOYS,
by George E. Gazza and Thomas S. DeSisto.
Jul 64, 35p
AMRA TR64 16

Unclassified report

Descriptors: (*Sheets, Refractory metal alloys), (*Niobium alloys, Mechanical properties), (*Tantalum alloys, Mechanical properties), (*Molybdenum alloys, Mechanical properties), (*Refractory metal alloys, Sheets), Tensile properties, Loading (Mechanics), Temperature, Stresses, Rupture, Deformation, Welds.

Five columbium base alloys, three tantalum base alloys, and two molybdenum base alloys have been evaluated by the U. S. Army Materials Research Agency. Mechanical properties were determined by tensile testing at room temperature and elevated temperatures, stress rupture testing, and bend testing of base metal specimens and welded specimens. The properties of the alloys are compared with target requirements established by the Alloy Requirements and Selection Group, Materials Advisory Board. Significant progress in refractory metal sheet development is demonstrated by a comparison of the test data with target properties. In general, the properties of the alloys approached or exceeded the target requirements. (Author)

AD-608 190 Div. 17, 13, 26
OTS Prices: HC $1.00/MF $0.50

Brush Beryllium Co., Cleveland, Ohio.
DEVELOPMENT OF VERY HIGH STRENGTH BERYLLIUM WIRE.
Bimonthly rept. no. 5, 6 Aug-6 Oct 64,
by E. A. Murphy and R. G. O'Rourke. 22 Oct 64,
19p BBC-374-243
Contract NOw64 0162c

Unclassified report

See also AD-603 066.

Descriptors: (*Wire, Tensile properties), (*Beryllium, Wire), (*Drawing (Machine processing), Beryllium), Beryllium alloys, Copper alloys, Extrusion, Iron alloys, Strain (Mechanics), Feasibility studies.

The object of the project is to produce fine beryllium wire at sizes in the range of 0.010-inch to 0.004-inch diameter at a target ultimate tensile strength of 300,000 psi. This work includes a study to determine the feasibility of using several nonstandard beryllium materials known to have higher strength in other wrought forms as starting materials to produce fine wire with the current warm drawing process.

AD-608 237 Div. 17, 26
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
VANADIUM ALLOY STUDIES.
Bimonthly progress rept. no. 4, 1 Aug-30 Sep 64,
by D. Weinstein and F. C. Holtz. 30 Sep 64, 14p
IITRI-B6021-4
Contract NOw64 0239c

unclassified report

descriptors: (*Vanadium alloys, Creep), Niobium alloys, Tantalum alloys, Titanium alloys, Refractory metal alloys, Dispersion hardening, Sheets, Mechanical working, Silicon coatings, Oxidation, Heat treatment.

A vanadium alloy development program is being conducted for the purpose of producing improved short-time creep properties in the temperature range of 2200-2400F. At present, the composition V-40Cb-30Ta-1Ti represents the material having the best creep properties without sacrificing fabricability or coatability; on the basis of creep strain over a 2 hr period at 2200F, previously evaluated vanadium alloys. Work on the modification of this composition using a variety of approaches to produce a stable, high-strength particle dispersion is continuing. (Author)

AD-608 241 Div. 17, 26
OTS Prices: HC $5.00/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THERMAL TREATMENT AND PROPERTY OF ALLOYS, 1962, VOL. 55.
2 Oct 64, 186p
FTD MT64 83; TT 65 60015

Unclassified report

Edited machine trans. of Aviatsionnyi Tekhnologicheskii Institut, Moscow. Trudy (USSR) 1962, v. 55, p. 1-161. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Alloys, Mechanical properties), (*Heat treatment, alloys), Chromium alloys, Nickel alloys, Steel, Aluminum alloys, Zinc alloys, Magnesium alloys, Titanium alloys, Silicon alloys, Germanium alloys, Aging (Materials), Stresses, Corrosion, Grain structures (Metallurgy), Single crystals, Phase studies, Microstructure, Recrystallization, Dynamics, Reports.

This collection of articles is dedicated to investigation of structure and properties of structural steels, formed aluminum alloys, and titanium and titanium alloys depending upon composition and conditions of heat treatment. Considered also are certain general problems of metal science (structure of single crystals of aluminum, silicon, and germanium, and peculiarities of pseudobinary sections of ternary systems). This book is intended for scientists, engineer-metal scientists and heat treaters, and also for students of senior courses of technical colleges. (Author)

AD-608 281 Div. 17, 26
OTS Prices: HC $2.00/MF $0.50

Titanium Metals Corp. of America, New York.
DEVELOPMENT OF A STABLE-BETA TITANIUM ALLOY.
Quarterly rept. no. 7, 1 Jan-31 Mar 64,
by D. B. Hunter. 31 Mar 64, 42p
Contract DA30 069ORD3743, Proj. 59332008
WAL TR405 2 6

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Titanium alloys, Dispersion hardening), (*Dispersion hardening, Titanium alloys), Vanadium alloys, Chromium alloys, Aluminum alloys, Silicon alloys, Nickel alloys, Iron alloys, Manganese alloys, Cobalt alloys, Molybdenum alloys, Heat treatment, Aging (Materials), Eutectics, Hardness, Microstructure, Rolling (Metallurgy), Ductility, Tensile properties, Hot working, Quenching (Cooling).

Samples of Ti-17V-10Cr-3Al-1Si, quenched from 2050F and aged at temperatures of 950-1150F, showed Vickers' hardness increases ranging up to 100 points after aging for 1 hour or more at 1150F. Lesser hardness increases were produced by aging at either 950 or 1050F. Ti-17V-10Cr-3Al-0:5Si showed a similar, although smaller aging response. Such hardness increases were not accompanied by any clear microstructural change. Substitution of 0.2% Be for Si resulted in no aging response. Hypereutectoid alloys Ti-(8-10)Ni-5Fe, Ti-(8-10)Ni-5Mn, Ti-(11-13)Co-5Fe, and Ti-(11-13)Co-5Mn were quenched from 1750 and 1850F and aged at 900F. A marked aging response was only found in those alloys containing Ni. Metallographic examination showed that melting occurred in these alloys during solution treatment. Hot rolling pressure determinations on stable-beta alloys Ti-17V-10Mn-3Al and Ti-8Mo-8V-6Fe-3Al showed that these alloys were no more difficult to hot roll than the commercial beta alloy Ti-13V-11Cr-3Al. Complete substitution of Co for Fe in a stable-beta alloy Ti-8Mo-8V-5Fe-3Al did not improve uniform elongation. (Author)

AD-608 334 Div. 17, 4, 13
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
STEEL CORROSION MECHANISMS; THE GROWTH AND BREAKDOWN OF PROTECTIVE FILMS IN HIGH-TEMPERATURE AQUEOUS SYSTEMS, STUDIES WITH 15% NaOH AT 316C.
Interim rept.,
by M. C. Bloom, G. N. Newport, and W. A. Fraser.
17 Apr 64, 18p
Proj. SR007 08 08 0613
NRL 6082

Unclassified report

Descriptors: (*Steel, Corrosion), (*Corrosive liquids, Feed water), (*Magnetite, Films), Sodium compounds, Hydroxides, Protective coverings, Oxides, Fracture (Mechanics), Diffusion, Reaction kinetics.

The report summarizes what is known regarding the reaction of steel with high-temperature water as affected by sodium hydroxide additions and also presents results of a detailed study, using the hydrogen effusion method, of the reaction of steel with 15-percent sodium hydroxide solution at 316C. The corrosion rates are correlated with a microscopic study of the growth and breakdown of the protective magnetite (Fe_3O_4) film. There are two different corrosion-rate-governing mechanisms involved prior to the onset of pitting: a large decrease of the initial corrosion controlled by the build up of a protective film on the metal surface, and a subsequent smaller decrease in corrosion rate possibly controlled by penetration of the magnetite film by the corrosive solution. The pitting is apparently due to the genesis of cracks in the magnetite film after it reaches a critical thickness. (Author)

AD-608 343 Div. 17
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
ACTION OF SODIUM CITRATE AND SODIUM BORATE ON THE POLARIZATION CHARACTERISTICS OF A URANIUM-STEEL COUPLE,
by Milton Levy and Philip Wong. Oct 64, 24p
Proj. 1A024401A11001
AMRA TR64 33

Unclassified report

Descriptors: (*Uranium alloys, Corrosion), (*Steel, Corrosion), (*Corrosion, Electrolysis), Polarization, Sodium compounds, Citrates, Borates, Solutions, Corrosion inhibition, Electric currents, Molybdenum alloys, Electrodes, Thermocouples.

The action of sodium citrate and sodium borate in aqueous media on the polarization characteristics of uranium and steel was studied. The effect of citrate and borate concentration on these polarization characteristics was also studied. Steady-state corrosion currents developed by the uranium-steel couple were measured using zero-resistance ammeter circuitry, and polarization measurements were made using galvanostatic techniques. Sodium citrate and sodium borate were classified as either accelerator or inhibitor, dependent upon concentration. (Author)

AD-608 348 Div. 17
OTS Prices: HC $3.00/MF $0.75

Iowa State Univ., of Science and Tech., Ames.
ELECTRICAL RESISTIVITY AND PHASE BOUNDARIES FOR THORIUM-CARBON ALLOYS.
Doctor's thesis,
by Fredrick William Korbitz, Jr. 1964, 70p

Unclassified report

Descriptors: (*Thorium alloys, Carbon alloys), (*Resistance (Electrical), Thorium alloys), (*Phase studies, Thorium alloys), Transformations, High-temperature research, Decomposition, Oxygen, Wire, Brittleness, Hardness, Metallography, Microstructure, X-ray diffraction analysis, Density.

Electrical resistivity measurements have been made on a series of thorium-carbon alloys. The electrical resistivities of thorium monocarbide, ThC, and thorium-dicarbide, ThC_2, at room temperature were found to be 115 ± 15 and 15 ± 2 microhm-cm respectively. The dicarbide undergoes two allotropic transformations, one at 1440 and one at 1490C. These transformation temperatures were observed on carburized thorium wires which had a thin layer of pyrolytic graphite on the surface. The trend of the transformation temperatures with decreasing carbon content, and hence the phase boundaries, was not definitely established. A reproducible resistivity discontinuity with temperature was observed at 1220 ± 20C for alloys in the composition range between ThC and ThC_2. The size of the discontinuity appeared to be a maximum at the composition of Th_2C_3 suggesting the possible existence of this compound at temperatures above 1200C and its decomposition into ThC and ThC_2 on cooling below 1200C. The phase boundaries suggested by the resistivity data have been outlined in a tentative phase diagram. (Author)

AD-608 385 Div. 17
OTS Prices: HC $2.00/MF $0.50

MSA Research Corp., Callery, Pa.
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS.
Rept. for 1 Jul 63-15 Aug 64,
by F. Tepper and J. Greer. Nov 64, 43p
Contract AF33 657 9168, Proj. 7312, Task 731202
ML TR64 327

Unclassified report

Descriptors: (*Liquid metals, Cesium), (*Cesium, Compatibility), (*Corrosive liquids, Cesium), (*Corrosion, resistant alloys, Cesium), Corrosion, Refractory metal alloys, Cobalt alloys, Chromium alloys, Tungsten alloys, Nickel alloys, Molybdenum alloys, Titanium alloys, Niobium alloys, Zirconium alloys, Tantalum alloys, Nickel, Zirconium, Solubility, High-temperature research, Impurities, Carbon, Microstructure.

Mechanisms associated with the corrosive attack of refractory metal alloys and superalloys by liquid cesium have been investigated. The superalloys, Haynes-25 and TD-Nickel, were exposed at 1800F and the refractory metal systems, Mo-1/2Ti, Cb-1Zr, Ta-10W and Cb-25Ta-12W-1/2Zr were exposed at 2100F and 2500F. Pure nickel and pure zirconium were employed as dissimilar metal additions in some tests. Boiling reflux tests of each alloy candidate were performed. In the case of the refractory alloys, the boiling temperatures were 2100 and 2500F, while 1800F was the test temperature employed for Haynes-25 and TD-Nickel capsules. The Haynes-25 and the TD-Nickel show some dissolution in cesium, and a measurable amount was experienced by Mo-1/2Ti at 2500F. The tantalum and columbium alloys show little in the way of cesium attack at 2100F. Metal solubility studies showed the solubility of the refractory metals columbium and molybdenum to be approximately 10-20 ppm at 2500F. Synergistic effects appear to control solubility in some cases. (Author)

AD-608 398 Div. 17, 25
OTS Prices: HC $4.00/MF $0.75

Electronic Properties Information Center, Culver City, Calif.
NIOBIUM, DATA SHEETS,
by Donald L. Grigsby. Nov 64, 111p DS-141
Contract AF33 615 1235, Proj. 7381,
Task 738103

Unclassified report

Descriptors: (*Niobium, Experimental data), Electrical properties, Magnetic properties, Electrical conductance, Resistance (Electrical), Hall effect, Transition temperature, Hysteresis, Thermionic emission, Thermal conductivity, Radiation damage, Single crystals, Specific heat, Thermal properties, Cryogenics, Electron transitions, Photons, Physical properties, Field theory, Superconductivity, Electromagnetic properties.

These data sheets present a compilation of a wide range of electrical and magnetic properties for Niobium of various purities in bulk and film form. Electrical properties include conductivity, resistivity, Hall coefficient and transition temperature. Magnetic properties include susceptibility, hysteresis and threshold field. Emission and energy data include thermionic properties, photon emissivities, absorption and energy gap. Debye temperature and thermal conductivity data are also given. Each property is compiled over the widest possible range of parameters from references obained in a thorough literature search. A summary of physical properties has been added. (Author)

AD-608 450 Div. 17
OTS Prices: HC $2.00/MF $0.50

IIT Research Inst., Chicago, Ill.
YIELDING IN POLYCRYSTALLINE METALS.
Interim technical rept. for 16 Nov 62-15 Nov 63,
by W. Rostoker and W. Brentnall. Oct 64, 34p
IITRI-B233
Contract AF33 657 7650, Proj. 7021, Task 7021 05
ARL 63 245 P2

Unclassified report

Descriptors: (*Metallic crystals, Deformation), (*Nickel, Deformation), (*Iron, Deformation), (*Iron alloys, Silicon alloys), Grain structures (Metallurgy), Extensometers, Grain boundaries, Metallography, Microstructure, Particle size, Strain (Mechanics), Tensile properties, Stresses.

Microyield, as revealed by etch pit techniques, shows slip activity well below strains of .000001. The grain size dependencies of microyield as defined by micro-extensometer measurements and by etch pit studies are essentially the same for the two methods as applied to Ni, Fe, and Fe-3% Si. The microyield of Fe is independent of grain size; it is shown that this is probably due to generation of active dislocations at inclusions which were very populous in this material. The microyield of Fe-3% Si and Ni are very much dependent on grain size, following the d to the (-1/2) power function as at higher strain levels. Slip in Fe does not reveal itself as well defined slip lines, but in an apparently uncoordinated multiplication of dislocations. Slip in Fe-3% Si and in Ni appears as well-defined slip lines and bands. Evidence is presented to show that dislocation sources in Fe-3% Si are primarily at grain surfaces. (Author)

18. Military Sciences and Operations

AD-608 078 Div. 18
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
REVOLUTION IN MILITARY AFFAIRS, ITS IMPORTANCE AND CONSEQUENCES (MILITARY ART ON A NEW STAGE),
by V. Sokolovskii and M. Cherednichenko. 13 Oct 64, 14p
FTD TT64 995; TT 64 71685

Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 22, 25 Aug, p. 2-3.

Descriptors: (*Military strategy, USSR), (*Armed forces operations, Theory), Military tactics, War potential, Weapon systems, Warfare, Reviews.

A theoretical treatment of improving methods and forms of strategic, operational and tactical utilization of armed forces for the attainment of war goals.

AD-608 108 Div. 18, 28
OTS Prices: HC $3.00/MF $0.50

Laboratory of Aviation Psychology, Ohio State Univ. Research Foundation, Columbus.
SUBJECT CONTROL OVER A BAYESIAN HYPOTHESIS-SELECTION AID IN A COMPLEX INFORMATION-PROCESSING SYSTEM.
Final rept. for 1 Jun 63-15 Apr 64,
by Jack F. Southard, David A. Scum, and George E. Briggs. Sep 64, 54p
Contract AF33 657 10763, Proj. 7184, Task 718403
AMRL TR64 95

Unclassified report

Descriptors: (*Decision making, Threat evaluation), (*Threat evaluation, Decision making), Military psychology, Human engineering, Information retrieval, Computers, Mathematical prediction, Simulation.

This report describes the second experiment in a series devoted to estimating the effectiveness of automated hypothesis selection in man-machine systems in which threat evaluations or threat diagnoses are being performed. In the experiment an eight-man team produced evaluations of various threats posed by a hypothetical aggressor. These evaluations were made on the basis of intelligence information gathered on simulated reconnaissance overflights of the homeland area of the aggressor. IBM 1401 and 7090 computer facilities provided the means for generating the complex stimulus environment or data base. The primary output from this threat evaluation team was a series of a posteriori probabilities estimations produced by the team's commanding officer (CO). These estimations represented the CO's judgments as to the most likely of the four response alternatives available to aggressor in deploying his forces along a border of contention. The purpose of the experiment was to observe whether increasing control over the MBT-aid mechanism would increase the user's acceptance of the aid and improve his threat-diagnosis performance. (Author)

AD-608 344 Div. 18, 30, 32
OTS Prices: HC $3.00/MF $0.75

Technical Military Planning Operation, General Electric Co., Santa Barbara, Calif.
THE APPLICATION AND IMPLEMENTATION OF DEACON TYPE SYSTEMS.
Semi-annual technical rept. for Apr-Sep 64,
by Frederick B. Thompson. Oct 64, 94p RM64TMP-11
Contract Nonr4101 00, Proj. NR011 05 02

Unclassified report

Descriptors: (*Military intelligence, Information retrieval), (*Command and control systems, Information retrieval), (*Information retrieval, Command and control systems), Language, Decision making, Computers, Artificial intelligence, Data processing systems.

Deacon (direct English access and control) is an advanced direct-access type of management information system deriving from a project concerning development of techniques for computing with a computer in essentially unconstrained English. Deacon-type systems respond to instructions and queries concerning the subject matter of their data by appropriately manipulating and organizing the data internally. The clues that guide the organizing activity are the syntactic rules of the language and their semantic transformations. Three examples of Deacon systems are given. The 'Deacon Breadboard Summary' of F. B. Thompson (RM 64TMP-9) accepts queries in English concerning its data base (representing list structures) and responds by printing out the answer. The second Deacon-type system is the on-line computing center for scientific problems of G. J. Culler and B. D. Fried (AD-296 532). The third is 'Sketchpad, a Man-Machine Graphical Communication System' (AFIPS Conference Proceedings, vol. 23, Spring Joint Computer Conference, 1963). Military applications of the systems are discussed, the central nation being organization of otherwise disconnected observations into relevant structures.

AD-608 380 Div. 18, 22, 28, 32
OTS Prices: HC $3.00/MF $0.75

Oklahoma Univ. Research Inst., Norman.
THE PSYCHOLOGICAL EFFECTS OF NON-NUCLEAR WEAPONS: A BIBLIOGRAPHY WITH SELECTED ABSTRACTS. VOLUME I.
Technical rept.,
by Monte M. Page, Clinton Goff, and J. D. Palmer.
Aug 64, 88p OURI-TR-1419-4
Contract AF08 635 3693

Unclassified report

Descriptors: (*Warfare, Reaction (Psychology)), (*Bibliographies, Warfare), Stress (Psychology), Emotions, Stress (Physiology), Psychological warfare, Abstracting, Sociometrics, Weapons, Weapon systems, Limited warfare, Psychometrics, Civilian personnel.

AD-608 448 Div. 18
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ATOMIC WEAPON AND ANTI-ATOMIC PROTECTION OF MILITARY UNITS. TRACING OF RADIOACTIVE CLOUD,
by G. Pozhidaev. 18 Nov 64, 10p
FTD TT64 1020; TT 65 60119

Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 207, 2 Sep, p. 2.

Descriptors: (*Decontamination, Aircraft), (*Radiological

contamination, Tactical warfare), Radioactivity, Radioactive fallout, Nuclear warfare, Protective clothing, Pilots, Aviation personnel, Landing fields, USSR.

Certain problems of assuring the tactical effectiveness of aviation under tactical conditions with the use of nuclear weapons are discussed. As is evident, contamination of an airfield with radioactive fallout complicates the maintenance of tactical equipment. Therefore, it is important that military personnel train continuously under conditions simultating actual combat conditions, in order that they may learn ways of protecting against radiological contamination both of themselves and of their equipment.

19. Navigation

AD-607 996 Div. 19
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
INERTIAL COMPONENTS STUDY.
Semiannual rept. for 1 Jul-31 Dec 58,
by L. K. Jensen. 31 Dec 58, 36p
STL/GM-TR-0165-00602
Contract AF04 647 165

Unclassified report

Descriptors: (*Inertial guidance, Instrumentation), Gyroscopes, Accelerometers, Servomechanisms, Performance (Engineering), Test methods, Test facilities, Guided missile components.

Contents: An evaluation of Arma gyros and accelerometers; A study of testing procedures for precision gyros; A study of acceleration measurement techniques and testing methodology; An evaluation of free floated gyro performance.

AD-608 059 Div. 19, 5, 8, 30
OTS Prices: HC $3.00/MF $0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF TIME-OF-DAY-MAGNETIC TAPE STORAGE AND RETRIEVAL EQUIPMENT.
Final rept.,
by C. Chapman. May 64, 58p
Proj. 103 500 03V
FAA RD64 72

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Air traffic control systems, Time interval counters), (*Time-interval counters, Recording system), (*Thin films (storage devices), Time interval counter), (*Magnetic tape, Air traffic control systems), Data storage systems, Information retrieval, Digital systems, Clocks, Air traffic control systems, Tests.

An evaluation of Time-of-Day Magnetic Tape Storage and Retrieval equipment was performed to determine the capability of the equipment to provide a Binary Coded Decimal (BCD) time-of-day reference that could be used for time-correlation of voice recordings on magnetic tape equipment within an Air Traffic Control Facility of the Federal Aviation Agency. Accuracy of the BCD time-of-day reference was determined using photographic techniques in conjuction with time references obtained from the NAFEC Range Control Central Facility and radio station WWV. Time-of-day continuity data were obtained by controlled data recording and systematic observations during reproduction of the BCD time-of-day reference. It was concluded that the equipment was capable of generating precise BCD time-of-day indices for the purpose of time-correlation of magnetic tape voice recordings. It was recommended that following the correction of the deficiencies noted in this report, the equipment be adopted for use within air traffic control facilities and prior to Agency-wide implementation, the first article be installed at an operational location to further determine reliability, maintainability and operational effectiveness. (Author)

AD-608 100 Div. 19, 8
OTS Prices: HC $1.00/MF $0.50

Sperry Microwave Electronics Co., Clearwater, Fla.
ATCRBS SLS OMNI DIRECTIONAL ANTENNA PROTOTYPE MODELS I AND II.
Final engineering rept.,
by R. E. Strother. 7 Apr 64, 20p
Contract FA WA4656, Proj. 108 2

Unclassified report

Descriptors: (*Air traffic control systems, Omni directional antennas), (*Omni directional antennas, Air traffic control systems), (*Radar antennas, Air traffic control systems), Antenna lobes, Radar beacons, Design, Antenna feeds, Radomes, Antenna radiation patterns, Performance (Engineering), Standing wave ratios, Gain, Resistance (Electrical), Electrical impedance, Environmental tests.

This report covers the design and production of two prototype omni-directional antennas for implementation of the 3-pulse sidelobe suppression technique with the ATCRBS ground station. The two types of antennas differ in that the mounting flange of Prototype Model I is located at the base for mounting atop a metallic mast, and the mounting flange for Prototype Model II is located at the top for suspension installation within a spherical radome, housing the ground radar equipment. Also, the phasing device in the feed line differs in the two types of antennas to provide the desired beam tilt. The antennas are series fed colinear dipole arrays properly spaced and phased to produce a vertical pattern very nearly coincident with that of the beacon directional antenna. (Author)

AD-608 428 Div. 19, 1, 12
OTS Prices: HC $3.00/MF $0.75

Westinghouse Electric Corp., Baltimore, Md.
SOLID STATE VIBRATING GYROSCOPE TECHNIQUE STUDY.
Final rept. for Jun 63-Jul 64,
by J. J. Buckley, D. W. Roese, and J. W. Shearer.
Oct 64, 75p Westing-1712A
Contract AF33 657 11629, Proj. 8222, Task 822209
FDL TDR64 101

Unclassified report

See also AD-410 455.

Descriptors: (*Gyroscopes, Feasibility studies), (*Piezoelectric effect, Gyro stabilizers), Vibration, Piezoelectric gages, Inertial guidance, Instrumentation, Solid state physics, Stabilization systems.

This report describes an applied research effort with the specific objective of determining and demonstrating the practical feasibility of using the solid state gyroscope as a vehicle stabilization sensor. The solid state gyroscope is a monolithic configuration of a vibrating gyroscope device. The sensing element is a polycrystalline piezoelectric ceramic cylinder which has been selectively polarized such that it is the equivalent of a self-driven spring-mass system and is its own output signal generator. Basic characteristics such as the zero angular rate null signal, which adversely influence the stability and the sensitivity of the instrument, have been investigated. Feasibility models have been designed and fabricated and have undergone both performance and environmental evaluations. The results provide a clear determination of the feasibility of the technique for sensing both high and low angular rates while utilizing an extremely small volume, power consumption, weight, and having a maximum reliability. Applications, as well as areas in which future research endeavors should be concentrated, are discussed. (Author)

20. Nuclear Physics and Nuclear Chemistry

AD-608 016 Div. 20
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
RAMO-WOOLDRIDGE GENERAL RESEARCH PROGRAM, 1959. B. ARTIFICIAL METEORS. Progress rept.,
by H. C. Corben, B. Hamermesh, H. Shelton, R. F. Wuerker, and J. F. Friichtenicht. 1 Mar 60, 8p
Unclassified report

Descriptors: (*Charged particles, Particle accelerator techniques), (*Particle accelerator techniques, Charged particles), Electrostatic accelerators, Acceleration, Voltage, Particle trajectories, Particle acceleration targets, Electron microscopy, Cratering, Electrolytic polishing, Metals, Velocity.

A report on the research done on electrostatic acceleration of charged particles is presented. The technical aspects of accelerating ballistic projectiles by electric fields and the operation of a 120 kv accelerator were discussed in previous reports. It was demonstrated that particles having dimensions of a few microns could be efficiently accelerated to 2 km/sec or so at modest voltage levels.

AD-608 081 Div. 20, 30
OTS Prices: HC $7.25/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THEORY OF CIRCULAR ACCELERATORS,
by A. A. Kolomenskii and A. N. Lebedev. 21 Sep 64, 421p
FTD MT64 94; TT 64 71681
Unclassified report

Edited machnie trans. of mono. Teoriya Tsiklicheskikh Uskoritelei, Moscow, 1962, 352p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Particle accelerators, Theory), Magnetic fields, Electric fields, Betatrons, Theory, Differential equations, Nonlinear systems, Resonance, Synchrotrons, Radiation damage, Cyclotrons, Synchrocyclotrons, Mathematical models, Charged particles, Strong focusing accelerators, USSR, Particle accelerator techniques.

This book contains a systematic account of the general theory of contemporary circular accelerators and a description of the peculiarities of various types of installations. Both principal theoretical questions and the most essential applied problems and methods of calculating parameters and tolerances are treated in this book. Special attention is given works completed during the last few years and devoted to problems of obtaining maximums of energy and intensity of accelerated particles. Strong-focusing accelerators, radiation effects, the problem of the accumulation of particles, etc., are considered in detail. This book is intended for scientific workers and engineers working with physics of high-energy particles and acceleration technology and also for post-graduates and students of appropriate specialities. (Author)

AD-608 136 Div. 20
OTS Prices: HC $1.00/MF $0.50

High Energy Physics Lab., Stanford Univ., Calif.
THE STRUCTURE OF He3 AND H3 FROM HIGH-ENERGY ELECTRON SCATTERING,
by T. A. Griffy and R. J. Oakes. Oct 64, 16p
ITP-141, HEPL-348
Contract AF49 638 1389, Grant NSF-GP948
Unclassified report

Prepared in cooperation with Institute of Theoretical Physics, Dept. of Physics, Stanford Univ., Calif.
Presented at the International Conference on Correlations of particles emitted in Nuclear Reactions, Gatlinburg, Tenn., 15-17 Oct 64.

Descriptors: (*Tritium, Nuclear structure), (*Helium, Nuclear structure), (*Nuclear structure, Analysis), Nuclei, Nucleons, Electrons, Protons, Nuclear cross sections, Scattering, Functions.

The structure of the three-nucleon systems He3 and H3 has been the subject of much recent experimental and theoretical investigation. Elastic scattering of high-energy electrons from these nuclei has been used to measure the charge and magnetic form factors of both He3 and H3. Theoretical analysis of these form factors has yielded new information concerning the wave function for the three-nucleon system. An analysis was made of the recent measurements of the electron-proton coincidence cross section from He3 and H3 to obtain additional information on the wave function for these nuclei. An adequate fit to the present data can be obtained using a completely symmetric S-state Irving-Gunn wave function. An admixture of the mixed symmetry S-state larger than about 2% can be excluded. (Author)

AD-608 167 Div. 20
OTS Prices: HC $2.00/MF $0.50

High Energy Physics Lab., Stanford Univ., Calif.
ELECTRON SCATTERING BY CALCIUM AT 250 MeV,
by M. Croissiaux, R. Hofstadter, A. E. Walker, D. G. Ravenhall, and B. C. Clark. 15 Sep 64, 39p
HEPL-347
Unclassified report

Supported in part by the Office of Naval Research, Washington, D. C. and the National Science Foundation, Washington, D. C.

Descriptors: (*Calcium, Nuclear cross sections), (*Electrons, Nuclear scattering), (*Nuclear scattering, Electrons), Electron bombardment, Elastic scattering, Inelastic scattering, Density, Functions, Nuclei, Spheres, Differential cross sections, Nuclear physics.

The doubly-magic nucleus of Ca(40) has been investigated by the electron scattering technique at an incident energy of 250 MeV. The elastic scattering behavior has been resolved from the inelastic scattering and absolute data on cross sections have been obtained for both types of events. In the case of the elastic scattering the first and second diffraction features have been observed and measured. It has been possible to make a comparison of the elastic data with theoretical calculations based on a phase shift analysis for certain assumed models of the nuclear charge density distribution. The combination of such an analysis with the present data, and also with earlier data on the same nucleus, permits the determination of the radius and skin thickness of the Ca(40) nucleus with a precision greater than has been attainable heretofore. An investigation of the dependence of the density distribution on a third parameter indicates that a Fermi distribution, or models close to this type, are required to fit the experimental data. A Fermi radial charge density distribution with radius c =3.60 F, and skin thickness t = 2.50 F fits the data extremely well. (Author)

AD-608 202 Div. 20
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LINEAR ION ACCELERATORS,
by D. V. Karetnikov, I. N. Slivkov, V. A. Teplyakov, A. P. Fedotov, and B. K. Shembel'. 11 Aug 64, 247p
FTD MT63 282; TT 65 60011

Unclassified report

Edited machine trans. of Lineinye Uskoriteli Ionov, Moscow, 1962, 208p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Linear accelerators, Ion accelerators), (*Ion accelerators, Linear accelerators), Particle accelerators, Particle accelerator techniques, Particle trajectories, Focusing, High frequency, Resonators, Injection, Electric insulation, Vacuum, Excitation, Particle accelerator components, Nuclear engineering, Nuclear physics, USSR.

Contents: Principles of operation of a linear accelerator; Theory of the motion of particles in an accelerator; Focusing in a linear accelerator; High frequency accelerating systems; Injection devices; The electrical strength of vacuum insulation and spurious loads in accelerators; Problems of high-frequency feed; Construction of linear accelerators.

AD-608 209 Div. 20
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
PERFORMANCE CHARACTERISTICS OF THE FPP-15 FILTER MATERIAL USED IN THE USSR FOR ENVIRONMENTAL RADIOACTIVITY MONITORING,
R. L. Patterson Jr., L. B. Lockhart Jr., and W. L. Anderson. 30 Sep 64, 16p
Contract AT49 7 2435, Projs. RR004 02 42 5151, RR001 01 43 4700
NRL 6165

Unclassified report

Descriptors: (*Radiation monitors, Gas filters), (*Gas filters, Radiation monitors), Radiological contamination, Airborne, Polyvinyl chloride, Fibers (Synthetic), Paper, Particles, Gas flow, Electrostatics, Aerosols, Effectiveness, USSR.

A survey of the physical properties and operational characteristics has been made of the FPP-15 filter paper widely used in the Soviet Union for monitoring airborne radioactivity. This filter material is composed of a thin mat of small-diameter, unoriented fibers of polyvinyl chloride deposited on a cotton scrim backing. Due to its composition, the filter readily picks up an electrostatic charge which causes some difficulty in handling but which contributes to an increased initial retentivity toward submicron aerosol particles. Functionally, the filter combines low resistance to air flow with good retentivity toward fission-product aerosols. (Author)

AD-608 291 Div. 20, 25
OTS Prices: HC $4.00/MF $1.00

Brandeis Univ., Waltham, Mass.
POSITRON ANNIHILATION RATE IN AN ELECTRON GAS.
Doctoral thesis,
by Birger Bergersen. May 64, 138p
Contract Nonr1677 04

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Positrons, Annihilation reactions), (*Annihilation reactions, Positrons), Electrons, Plasma medium, Polarization, Dielectric properties, Perturbation theory, Field theory.

A discussion is given of different computational methods for the evaluation of the positron annihilation rate in an electron gas, and a comparison is given with experimental data for positron annihilation in certain metals. Special emphasis is put on the consistency requirements of the problem, these being (1) the polarization cloud around the positron should have unit charge, (2) the electron 'positron' and electron electron pair correlation function be positive definite even if the positron charge is varied, and (3) the Nozieres and Pines sum rule for the dielectric constant should be satisfied. A detailed discussion is given on how these requirements are taken into account in perturbation theory. Finally, a specific ansatz is made for the polarization cloud around the positron in terms of a bound state wave function orthogonalized to a set of deformed plane waves. (Author)

AD-608 317 Div. 20, 14, 17, 26
OTS Prices: HC $3.00/MF $0.50

Alco Products, Inc., Schenectady, N. Y.
SPECIFICATIONS AND FABRICATION PROCEDURES FOR PM-2A NEUTRON ABSORBER SECTIONS.
11 Jun 59, 54p APAE-M-203
Contract DA30 347eng284

Unclassified report

Descriptors: (*Neutron absorbers, Manufacturing methods), Nuclear power plants, Control rods, Europium compounds, Oxides, Stainless steel, Reactor cores, Powder metals, Rare earths, Specifications, Cladding, Welding, Composite materials, Reactor materials.

The control rod absorber section consists of composite plates joined by welding to form a rectangular parallelepiped. The composite plates consist of compacts of europium oxide in a stainless steel matrix that are clad with stainless steel by hot roll-bonding. These specifications cover materials and process required to produce the absorber sections. The procedural specifications are specific for manufacturing these components at ORNL, and represent a detailed guide for fabricators. It is recognized that because of differences in equipment, fabricators may be required to modify some of the detailed procedures to arrive at the same result. Prior approval for any deviation from these specifications must be approved by ALCO Products Inc., or its authorized representative.

AD-608 318 Div. 20, 14, 17, 26
OTS Prices: HC $3.00/MF $0.75

Alco Products, Inc., Schenectady, N. Y.
SPECIFICATIONS AND FABRICATION PROCEDURES FOR PM-2A STATIONARY FUEL ELEMENTS.
11 Jun 59, 100p APAE M-201
Contract DA30 347ENG284

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Reactor fuel elements, Manufacturing methods), Nuclear power plants, Reactor fuel plates, Reactor cores, Stainless steel, Uranium compounds, Dioxides, Powder metals, Bonding, Cladding, Reactor materials, Reactor poisons, Powder metallurgy, Reactor fuel cladding, Specifications.

Stainless steel-base fuel components of thin plate-type construction and containing a dispersion of UO2 have been successfully employed in powering the Army Package Power Reactor (SM-1). The component is designed for radioactive service in pressurized water and consists of eighteen composite fuel plates joined into an integral unit or assembly by brazing. Specifications covering loading, materials, and processing are presented. A list of applicable drawings and the process flow diagram are included.

AD-608 319 Div. 20, 11, 17, 26
OTS Prices: HC $3.00/MF $0.75

Alco Products, Inc., Schenectady, N. Y.
SPECIFICATIONS AND FABRICATION PROCEDURES FOR PM-2A CONTROL ROD FUEL ELEMENTS.
1' Jun 59, 94p APAE M-202
Contract DA30 347ENG284

Unclassified report

Descriptors: (*Reactor fuel elements, Manufacturing methods), Nuclear power plants, Reactor fuel rods, Reactor cores, Stainless steel, Uranium compounds, Dioxides, Powder metals, Specification, Bonding, Cladding, Reactor materials, Reactor poisons, Powder metallurgy, Reactor fuel cladding.

Stainless steel-base fuel components of thin plate-type construction and containing a dispersion of UO2 have been successfully employed in powering the Army Package Power Reactor. The component is designed for radioactive service in pressurized water and consists of sixteen composite fuel plates joined into an integral unit or assembly by brazing. Specifications covering loading, materials, and processing are presented. A list of applicable drawings and the process flow diagram are included.

AD-608 392 Div. 20
OTS Prices: HC $1.00/MF $0.50

Washington Univ., St. Louis, Mo.
PULSED MAGNETIC RESONANCE STUDIES AT LOW TEMPERATURES,
by Richard E. Norberg. 30 Jun 64, 7p
Grant DA ARO D31 124G65, Projs. 59901004, 2791P
AROD 2791 5

Unclassified report

Descriptors: (*Helium, Nuclear magnetic resonance), (*Xenon, Nuclear magnetic resonance), Nuclear spins, Relaxation time, Diffusion, Excitation, Liquefied gases, Solidified gases, Low-temperature research, Spectroscopy, Phonons, Nuclear scattering, Radioactive decay, Cryogenics.

The method of pulsed nuclear magnetic resonance was applied to measurements of nuclear spin susceptibility, relaxation times and atomic self diffusion in liquid and gaseous He3 and in solid and liquid xenon. A search was initiated for a predicted dispersion in the excitation spectrum of helium II. The dispersion is expected to be accompanied by phonon decay processes, which are to be detected in a scattering chamber. (Author)

AD-608 416 Div. 20
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
PHYSICS OF THE MOSSBAUER EFFECT.
Physical Sciences Research Papers,
by Leonard J. Eyges. Oct 64, 40p
Proj. 0000
AFCRL 64 840, AFCRL PSRP 58

Unclassified report

Descriptors: (*Mossbauer effect, Nuclear physics), Gamma rays, Crystal lattices, Nuclei, Probability, Photons.

This paper considers from a simple physical point of view the Mossbauer effect, i. e., the 'recoilless emission' of gamma-rays from a nucleus bound in a crystal lattice. It begins with a discussion of the kinematics of gamma-ray emission from such a nucleus. The idealized case of a massive 'lattice' characterized by a single frequency and the more realistic one and three-dimensional models are treated. We point up the fact that in the Mossbauer effect the lattice as a whole (the lattice center of mass) always recoils after photon emission, so that the term 'recoilless emission' is in one sense misleading. We emphasize that the essence of the Mossbauer effect is not photon emission without recoil, but rather is photon emission without transfer of energy to internal degrees of freedom of the lattice. Using the basic ideas of quantum mechanics, namely, the rules for the manipulation of probability amplitudes (the so-called 'transformation theory'), we calculate the probability for recoil without excitation of internal degrees of freedom, i. e., the Mossbauer f-factor, on the assumption that the individual photon emissions, consequent lattice recoil, are instantaneous. In Appendix A we discuss this question of instantaneous emission in some detail, and show how it is not in contradiction with the fact that the nuclear transition that leads to the gamma-ray emission has a finite half-width. In Appendix B those rules of transformation theory that are used in the body of the paper are summarized. (Author)

AD-608 457 Div. 20, 25
OTS Prices: HC $2.00/MF $0.50

Michigan Univ., Ann Arbor. Coll. of Literature, Science and the Arts.
DIBOSON PRODUCTION BY PIONS OF 12 AND 18 GEV/C.
Technical rept. no. 17,
by L. W. Jones, D. Harting, W. Middelkoop, B. Zacharov, and D. O. Caldwell. Sep 64, 38p
ORA-03106-16-T
Contract Nonr1224 23, Proj. 03106

Unclassified report

Descriptors: (*Bosons, Pair production), (*Pions, Nuclear reactions), Mesons, K mesons, Nuclear cross sections, Recoil atoms, Nucleons, Nuclear spectroscopy.

Results of the analyses of about 5,000 events involving peripheral boson pair production by high energy pions are discussed.

Division 21 - NUCLEAR PROPULSION
Division 22 - ORDNANCE

21. Nuclear Propulsion

AD-608 075 Div. 21, 20, 25
OTS Prices: HC $4.00/MF $1.00

AiResearch Mfg. Co., Los Angeles, Calif.
FORCED-CONVECTION VAPORIZATION OF POTASSIUM IN A SINGLE TUBE,
by P. J. Berenson. Nov 64, 150p
Contract AF33 615 1551
APL TDR64 115

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nuclear propulsion, Heat transfer), (*Potassium, Vaporization), Space propulsion, Nuclear reactors, Boilers, Boiler tubes, Reactor coolants, Liquid metal coolants, Data processing systems.

The report describes work undertaken to resolve uncertainties in the forced-convection vaporization characteristics of potassium that affect the SNAP-50/SPUR boiler design. A review is presented of liquid-metal and forced-convection vaporization heat transfer. The test program and single-tube boiler developed to measure liquid and high-vapor-quality potassium heat transfer coefficients are described. Finally, the data processing procedure and results of the test program are described and discussed. The major conclusions were that, with a twisted-tape insert in the tube, the quality beyond which the heat transfer coefficient decreases very rapidly, due to the formation of dry spots, is 80 to 90 percent, and the heat transfer coefficient beyond this quality remains an order of magnitude greater than the corresponding dry-vapor coefficient. (Author)

AD-608 123 Div. 21, 12, 30
OTS Prices: HC $5.00/MF $1.00

Tracerlab, Inc., Richmond, Calif.
ANALYSIS OF HIGH-ALTITUDE FILTER AND IMPACTOR MEDIA FOR EVALUATION OF PROPOSED SNAP REENTRY EXPERIMENT USING NONRADIOACTIVE TRACER.
Final rept.,
by Walter D. Holland, Chester E. Gleit, Philip A. Benson, Robert C. Wrigley, and Leon Leventhal.
Sep 64, 156p TLW-1092
Contract AF29 601 5221, Proj. 1831, Task 183105
WL TDR64 68

Unclassified report

Descriptors: (*Radioactive waste, Spacecraft nuclear propulsion), (*Spacecraft nuclear propulsion, Radioactive waste), (*Atmosphere entry, Spacecraft nuclear propulsion), (*Test methods, Spacecraft nuclear propulsion), Feasibility studies, Labeled substances, Simulators, Cadminum, Indium, Gold, Rhenuim, Tantatum, Silver, Safety, Collecting methods, Air pollution, Chemical analysis, Rare earth elements, Neutron activation, Radioactivation analysis, Thulium, Uranium, Radioactive fallout, Gas filters.

This study was initiated to evaluate the feasibility of using simulator elements as tracers to determine the potential hazard involved in atmospheric reentry of SNAP devices. The sensitivity of such a simulator experiment is determined in part by the backgrounds of the atmosphere and the collection media. Several materials selected as representative high-purity filter media and impactor substrates were analyzed by neutron activation analysis followed by radiochemical separations. These materials included IPC Grade 107, cotton base paper, Microsorban, Suprasil high-purity quartz, collodion, and silicone oil. Analysis of special flown filter samples determined that uranium was present in the atmosphere, but no other elements were detected above media background. The two most suitable tracers based on least amounts found in all collection media studied are thulium and rhenium.

22. Ordnance

AD-608 251 Div. 22, 14
OTS Prices: HC $1.00/MF $0.50

Bureau of Mines, Pittsburgh, Pa.
SENSITIVITY CHARACTERISTICS OF LIQUID EXPLOSIVE SYSTEMS.
Progress rept. no. 11, 1 Jul-30 Sep 64,
by Frank C. Gibson, John Ribovich, and J. Edmund Hay. Nov 64, 22p
Contract IPR19 64 8026WEPS

Unclassified report

Descriptors: (*Explosive materials, Sensitivity), (*Detonation waves, Measurement), Propellants, Detonations, Explosives initiators, Velocity, Probes (Electromagnetic), Shock waves, Liquids, Containers, Aluminum, Acrylic resins, Polyethylene plastics, Nitroglycerin, Glycols, Nitrates, Triacetin.

This is the eleventh report concerning the research program established to evaluate hazards associated with high-energy liquid explosives and explosive systems. During this report period, further improvements were made in the probe developed to follow continuously the initiation and growth of high velocity detonation (HVD), low velocity detonation (LVD), and low velocity reaction (LVR), where LVD represents an apparently stable form of LVR. Shock sensitivity scales have been established for the nitroglycerin-ethyleneglycol dinitrate (NG-EGDN)-triacetin (TA) system in aluminum, Plexiglas, and polyethylene containers. The data obtained with the aluminum container were used to compare the sensitivity of casting solvents with the NG-EGDN-TA system.

AD-608 400 Div. 22, 9
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
WATER-TUNNEL TESTS OF BASE-VENTED TORPEDO MODELS,
by T. G. Lang and H. V. L. Patrick. Nov 64, 30p
NOTS TP3587; NAVWEPS 8559

Unclassified report

Descriptors: (*Torpedo models, Drag), (*Drag, Torpedo models), Water tunnels, Model tests, Ventilation, Fluid dynamic properties, Hydrodynamic configurations, Hydrofoils, Gas flow, Angle of attack.

Tests were performed in a free-surface water tunnel to determine the ventilated-drag characteristics of truncated torpedo models. The streamlined, fully wetted model used for comparison in the experiments was a body of revolution with a fineness ratio of 8 : 1 and a diameter of 2 inches. The drag based on body volume for most of the vented, truncated models was equal to the drag of the streamlined, fully wetted model. One particular model, with a short, boattailed afterbody, was the best of the vented configurations from the standpoint of combined low drag and low air flow. At no time during the tests did any of the models ventilate forward of the base. (Author)

23. Personnel and Training

AD-607 991 Div. 23, 16
OTS Prices: HC $2.00/MF $0.50

Marine Corps Base, Camp Pendleton, Calif.
PERIODIC CHANGES IN CIRCULATION AND PERFORMANCE DURING MILITARY TRAINING,
by W. M. Hammer. 1963, 50p
Unclassified report

Rept. on Physical Fitness Research Proj.

Descriptors: (*Physical fitness, Military training), (*Military training, Physical fitness), Performance tests, Exercise, Cardiovascular system, Pulse rate, Coast Guard research.

A one minute step test at thirty-six steps per minute on a seventeen inch bench was given sixty U. S. Coast Guard Reservists on active duty for training while participating in an accelerated combat infantry training course. The subjects were divided into two groups. A control group of thirteen were equated to an experimental group of thirteen subjects. The experimental group performed the U. S. Coast Guard Physical Exercise Program consisting of four exercises of eleven minutes total duration per day, as well as the regular combat infantry training experienced by the thirteen subjects in the equated control group. The results indicated that the recovery pulse rate, at the .01 level of confidence, made no significant changes in two weeks of combat infantry training on the control group, nor in the experimental group when matched with the control group. In both groups, however, there was a recovery pulse drop after training which at the end of three weeks of de-training reversed to pre-training levels.

AD-608 066 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
PROCEDURE FOR KEYING SELF-REPORT TEST ITEMS,
by Raymond E. Christal and Robert A. Bottenberg.
Aug 64, 11p
Proj. 7719, Task 771901
PRL TR64 22
Unclassified report

Descriptors: (*Air force personnel, Selection), Attitudes, Personality, Programming (Computers), Psychometrics.

Self-report questionnaires on opinions, attitudes, and personal history are commonly used to develop personality, attitude, and experience measures. This paper outlines a procedure for selecting the most valid keying pattern for scoring such items to predict a success or proficiency criterion. Unique scoring patterns are presented for computer application to items with 2, 3, 4, and 5 alternatives. Procedures are outlined for generating and checking patterns for k-alternative items. Computation shortcuts are suggested. (Author)

AD-608 067 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
PREDICTING FIRST YEAR ACHIEVEMENT OF AIR FORCE ACADEMY CADETS, CLASS OF 1965,
by Robert E. Miller. Aug 64, 23p
Proj. 7717, Task 771706
PRL TR64 23
Unclassified report

Descriptors: (*Air force personnel, Psychometrics), (*Officer personnel, Selection), (*Air force training, Officer personnel), Military requirements, Performance (Human), Apptitude tests, Motivation.

Candidates for each Air Force Academy class are required to establish their qualifications by taking a battery of selection tests. Those who are admitted are given a battery of experimental tests as part of a program for the development of officer selection and classification instruments. Predictive validities are determined for both batteries at the end of the fourth (freshman) class year against academic and nonacademic criteria of interest to Academy personnel. In the class of 1965 the criteria were the Academic Standard Score, the Military Rating (successor to the Cadet Effectiveness Rating), the Extracurricular Activities Standard Score, the Composite Standard Score, and Early Motivational Elimination. It was found that the experimental battery contains valid tests for each criterion, and that the selection battery contains valid tests for each criterion except Early Motivational Elimination. The experimental tests add to prediction from the selection battery of each criterion except the Academic Standard Score. The best multiple validity coefficients range from .31 for prediction of Early Motivational Elimination to .60 for prediction of the Academic and Composite Standard Scores. Tests common to the classes of 1964 and 1965 have similar validities and distribution statistics in the two classes. (Author)

AD-608 216 Div. 23, 28
OTS Prices: HC $2.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
CURRENT STATUS OF THE TECHNOLOGY OF TRAINING.
Technical rept.
by Gordon Eckstrand. Sep 64, 40p
Proj. 1710
AMRL TR64 86
Unclassified report

The paper was read by Gordon A. Eckstrand at the Annual Convention of the American Psychological Association (72th), held at Los Angeles, Calif., 4-9 Sep 64.

Descriptors: (*Training, Standards), (*Human engineering, Training devices), Personnel, Performance (Human), Learning, Simulation, Teaching machines, Military training, Psychometrics.

A brief overview of the current status of the technology of training is presented. The processes involved in designing a training system are arbitrarily analyzed into the following three areas: (1) determining training requirements, (2) developing the training environment, and (3) measuring the results of training. In each of these areas, an attempt is made to summarize and evaluate the adequacy of our technology. In a final section of the report, certain areas of research which appear to be especially promising are discussed. (Author)

AD-608 247 Div. 23
OTS Prices: HC $4.00/MF $0.75

Dunlap and Associates, Inc., Washington, D. C.
TRAINING FEEDBACK INFORMATION REQUIREMENTS

AND METHODS IN THE RESEARCH, DEVELOPMENT, TEST, AND EVALUATION OF NAVY SYSTEMS,
by Arthur W. Peters, Armand N. Chambers, and Robert M. Thomson. Jul 64, 104p ND-65-4
Contract Nonr4167 00

Unclassified report

Descriptors: (*Naval personnel, Training), (*Naval training, Feedback), (*Personnel management, Naval training), Military requirements, Education, Performance (Human), Achievement tests, Models (Simulations), Management control systems, Naval research, Research program administration.

The objectives of this study were to survey the present status of the training feedback (TF) process in the research, development, test, and evaluation (RDT and E) of Navy systems to determine its bearing on the effectiveness of present training evaluation programs. Examination of several Navy systems in various stages of development revealed that existing provisions for generating, disseminating and utilizing information are inadequate. Therefore, recommendations were developed for improvements to the TF process. These were classified as technical and management recommendations; and were treated in terms of whether they: (a) could be implemented with existing management or technical methods, or (b) would require additional research before they could be implemented. The TF process is considered to be only one specific portion of the overall personnel subsystem (PS) development and evaluation process; therefore, it is treated within this context.

AD-608 296 Div. 23
OTS Prices: HC $3.00/MF $0.50

Applied Science Associates, Inc., Valencia, Pa.
A FIELD EXPERIMENTAL STUDY OF PROGRAMMED INSTRUCTION ON A MANIPULATIVE TASK.
Final rept. for Aug-Dec 63,
by John D. Folley, Jr., Aubrey J. Bouck, and John P. Foley, Jr. Oct 64, 54p
Contract AF33 657 11358, Proj. 1710, Task 171004
AMRL TR64 90 Unclassified report

Descriptors: (*Military training, Training devices), (*Training devices, Military training), Performance (Human), Military personnel, Education, Analysis of variance, Small arms, Teaching machines.

Approximately 1300 basic military trainees were used in a 3 x 7 factorial study of modes and content of training on a manipulative performance task, the assembly and disassembly of the M1 carbine. The modes of training included lecture-demonstration, a printed linear program with or without an answer sheet, and an audio-visual program presented by an audio-visual device or by a printed booklet. Also evaluated was a condition in which the trainees tried to perform the final task and were assisted as required. The content of the training was varied by providing training on assembly only, or disassembly only, or both. The final criteria were the time and the number of assists required to disassemble and assemble the M1 carbine. Although the modes of training differed significantly, the rankings were very different on the two criteria. No mode of training seemed clearly superior to the other modes. The audio-visual program presented in the printed booklet seemed somewhat inferior. Training on only the assembly of the carbine resulted in as good performance as training on both assembly and disassembly. The findings probably can be generalized only to relatively simple procedural type tasks. Replication of the study with more complex performance tasks is recommended. (Author)

AD-608 309 Div. 23, 18, 28
OTS Prices: HC $2.00/MF $0.50

Laboratory of Aviation Psychology, Ohio State Univ. Research Foundation, Columbus.
EXPERIMENTS ON TEAM TRAINING IN A CIC-TYPE TASK ENVIRONMENT,
by George E. Briggs and James C. Naylor.
Jun 64, 42p
Contract N61339 1327
NAVTRADEVCEN 1327 1

Unclassified report

Descriptors: (*Military training, Combat information centers), (*Combat information centers, Training devices), Radar interception, Simulation, Learning, Group dynamics.

Three separate but related laboratory experiments were performed with three-man teams in a simulated radar-control interception task. Experiment I investigated the influence of a replacement of one team member with a new operator, the latter having either more or less on-the-job experience than the man replaced. Also investigated was the influence of task organization and task complexity. In Experiment II the influence of training task fidelity, training task organization, and transfer task organization was examined. Finally, Experiment III examined the influence of different amounts of experience on two kinds of training task organization and of transfer task organization. Replacement effects were significant but of short duration, but transfer task organization effects were of longer duration with performance on an independent task organization superior to that on an interaction version except when preceded by individual training and/or training specifically on communication procedures. (Author)

AD-608 325 Div. 23, 28
OTS Prices: HC $2.00/MF $0.50

Military Academy, West Point, N. Y.
THE RELATIONSHIPS OF SELECTED TEST MEASURES AND NEW CADET BARRACKS PERFORMANCE TO ATTRITION AND LATER CADET PERFORMANCE,
by Carl G. Lauterbach, David P. Vielhaber, and Edward Gottheil. Jul 64, 32p
Contract OTSG6 60 10 016
MA,WP TR15

Unclassified report

Rept. on Medical Research Proj.

Descriptors: (*Adjustment (Psychology), Army personnel), (*Army personnel, Military training), (*Military training, Adjustment psychology)), Performance (Human), Personality, Education, Aptitude tests, Achievment tests, Attitudes, Psychometrics, Military psychology, Statistical analysis, Correlation techniques.

This study investigated the relationships between certain personality attributes of entering United States Military Academy cadets and their subsequent performance during the New Cadet Barracks (NCB) summer training period and their first academic year. Two approaches used: (a) to determine the interrelations existing among personality tests and criteria of cadet performance; and (b) to discern differential patterns of personality and performance characteristics shown by groups of successful and unsuccessful cadets. Success was defined as retention during the first year at the Academy, while lack of success was defined as attrition from the Academy. The criteria of cadet performance were: (a) NCB and Aptitude for Service Ratings (adjustment to superiors and peers); (b) grades (adjustment to work); and (c) demerits (reactions to authority). A final criterion, frequency of NCB sick call visits, was used as an indicator of personal adjustment. Nine personality test measures were used. Three were derived from a test of stated reactions to frustrating situations, four were from ratings of relative esteem for self and co-workers, and one each from an Activities

Preference Inventory and a Proverbial Attitudes test of non-conforming attitudes. Each test measure was chosen on the basis of expected relationships to the performance criteria.

AD-608 327 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Military Academy, West Point, N. Y.
SICK CALL AS A CRITERION OF ADJUSTMENT AT THE UNITED STATES MILITARY ACADEMY,
by Edward Gottheil, David P. Vielhaber, and Carl G. Lauterbach. Jul 64, 18p
Contract OTSG6 60 10 016
MA,WP TR16

Unclassified report

Rept. on Medical Research Proj.

Descriptors: (*Adjustment (Psychology), Army personnel), (*Army personnel, Military training), (*Military training, Adjustement (Psychology)), Military medicine, Personality, Military psychology, Correlation techniques, Statistical analysis.

In the present study, cadet sick call visits were analyzed to provide information concerning: (a) the seasonal distribution of sick call rates according to type of medical problem; (b) the relationship between sick call rates and the day of the week (for example, higher on 'Blue Monday' than on Friday); (c) the relationship between sick call rates and certain special days such as holidays, and days when there are required inspections, parades, or reviews; and (d) the relationship between sick call rates and certain aspects of personality.

AD-608 328 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Military Academy, West Point, N. Y.
THE EFFECT OF A SUCCESSFUL EXPERIENCE IN FIELD MILITARY TRAINING ON LATER CADET PERFORMANCE AT THE UNITED STATES MILITARY ACADEMY,
by Edward Gottheil and David P. Vielhaber. Mar 64, 20p
Contract OTSG6 60 10 016
MA,WP TR14

Unclassified report

Rept. on Medical Research Proj.

Descriptors: (*Adjustment (Psychology), Army personnel), (*Army personnel, Military training), (*Military training, Adjustment (Psychology)), Performance (Human), Aptitude tests, Psychometrics, Performance tests, Attitudes, Leadership, Military psychology, Statistical analysis, Correlation techniques.

The subjects were 177 cadets at the United States Military Academy. The question raised was whether a successful or unsuccessful experience in field military training would affect a cadet's later performance at the Academy. Grades, aptitude ratings, and demerit scores were obtained on these cadets at the end of their first academic year. The summer session between their first and second academic years was devoted to practical military training at Camp Buckner. During this period they were tested as individuals and as squads for knowledge and skills acquired in the various areas of training. High scores in these tests were considered to indicate a successful experience, and low scores an unsuccessful experience. Two measures of success were employed: individual performance alone, and individual success reinforced by also being a member of a successful squad. Grades, aptitude ratings, and demerit scores were again obtained at the end of the first term of their second academic year. No evidence was found to support the hypothesis that a successful performance would be more effective in task-oriented than relationship-oriented individuals.

AD-608 329 Div. 23
OTS Prices: HC $1.00/MF $0.50

Military Academy, West Point, N. Y.
THE RELATIONSHIP BETWEEN CLASSROOM INSTRUCTION AND PRACTICAL PERFORMANCE IN MILITARY TACTICS,
by Edward Gottheil, Carl G. Lauterbach, and David P. Vielhaber. Mar 64, 10p
Contract OTSG6 60 10 016
MA,WP TR12

Unclassified report

Rept. on Medical Research Proj.

Descriptors: (*Army personnel, Education), (*Military training, Army personnel), (*Army training, Military tactics), (*Education, Officer personnel), Performance (Human), Achievement tests, Statistical analysis, Correlation techniques.

The science of tactics is taught at the United States Military Academy both by classroom, academic instruction and by practical, field exercises. The first and second year academic grades in tactics of 98 randomly selected cadets were compared with their performance in a variety of practical exercises at Camp Buckner. The Buckner encampment took place in the summer months between the first and second academic years and provided scores in the following areas: Armor, Artillery, Engineer, Infantry, Signal, Obstacle Course, and Written Test. The intercorrelations among the Buckner Test Scores were low and revealed no important patterns of relationship. Apparently different skills and abilities are required for the different events. The correlations between tactics grades and Combined Total Buckner Score were positive and statistically significant. The Correlation between tactics grades in the first and second years was statistically significant and indicated a substantial degree of association.

AD-608 330 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Military Academy, West Point, N. Y.
A NOTE ON THE STATISTICAL RELIABILITY OF DEMERIT SCORES AT THE UNITED STATES MILITARY ACADEMY,
by Edward Gottheil and David P. Vielhaber. Mar 64, 10p
Contract OTSG6 60 10 016
MA,WP TR13

Unclassified report

Rept. on Medical Research Proj.

Descriptors: (*Adjustment (Psychology), Army personnel), (*Army personnel, Military training), (*Military training, Adjustment (Psychology)), Performance (Human), Behavior, Statistical data, Correlation techniques.

The adjustment of a cadet at the United States Military Academy may be evaluated, for research purposes, in terms of three major criteria. These are the following: academic grades indicating adjustment to work; aptitude ratings by peers and superiors indicating adjustment in interpersonal relationships; and demerits

awarded by superiors indicating adjustment to authority. While the reliability of the aptitude ratings and academic grades have been established, the present note is concerned with the consistency and stability of demerit scores.

24. Photography and Other Reproduction Processes

AD-608 114 Div. 24, 25, 32
OTS Prices: HC $6.00/MF $1.25

Illinois Univ., Urbana. Agricultural Experiment Station.
AN ANALYSIS OF MEASUREMENTS OF LIGHT REFLECTANCE FROM TREE FOLIAGE MADE DURING 1960 AND 1961,
by Charles E. Olson, Jr., Ralph E. Good, Carl A. Budelsky, Richard L. Liston, and Dallas D. Munter.
Jun 64, 238p
Contract Nonr1834 31, Proj. NR387 025
Unclassified report

Descriptors: (*Aerial photography, Optical phenomena), (*Trees, Optical properties), (*Light, Reflection), Measurement, Photography, Forestry.

The following conclusions concerning light reflectance from tree foliage in the wavelength region from 400 to 700 millimicrons were drawn from this study: (1) Tree foliage becomes less reflective as it matures, up to the point where fall coloration reveals distinct changes in leaf pigmentation. (2) New pine needles are more reflective than one-year-old needles. The result is a gradual increase in light reflectance from pines during the early part of the growing season. Once the new needles are fully developed, reflectance tends to decrease during the late summer and fall. (3) Reflectance from broadleaved foliage is relatively high when the leaves first develop, declines during the spring and early summer, remains nearly constant or declines slightly during the summer, and increases strongly during the fall color change. (4) Reflectance from tree foliage is influenced by moisture conditions and declines when trees experience moisture stress. (5) Distinct tone contrasts between pines and braodleaved trees in leaf can be obtained most consistently on panchromatic aerial panchromatic aerial photography during the spring, when one-year-old needles dominate in pin pines and new foliage is appearing on deciduous trees. Strong tone contrasts can also be obtained when the broadleaved trees are leafless. (Author)

AD-608 277 Div. 24
OTS Prices: HC $4.00/MF $0.75

Houston Fearless Corp., Los Angeles, Calif.
COLOR IMAGE - ENHANCEMENT PROGRAM.
Final rept.
Jul 64, 120p HFC-R-130-64
Contract AF19 628 416, Proj. 6244, Task 624402
ESD TDR64 521 Unclassified report

The initial distribution copies contain color which will be shown in black-and-white when it is necessary to reprint.

Descriptors: (*Photographic images, Colors), (*Colors, Photographic images), (*Photointerpretation, Colors), Perception (Psychology), Photographic equipment, Photographic materials, Photographic techniques, Optics, Electronics, Wiring diagrams, Feasibility studies, Color photography.

The color image-enhancement program consisted of research and development to determine the feasibility of applying color in enhancing the image of a photograph for information extraction. The program included the design and fabrication of equipment to test and evaluate electronic and optical concepts. However, this equipment should not be considered as operational equipment. Considerable discussion is devoted to the theory of image enhancement and why certain equipment was chosen to test and develop the program. The program will have a follow-up color evaluation program which will test and produce enhanceable photographs in the form of slides for color projection. Testing with human observers will also be programmed and a final analysis will be made. (Author)

AD-608 418 Div. 24, 2, 12, 30
OTS Prices: HC $3.00/MF $0.75

Philco Research Labs., Newport Beach, Calif.
ENVIRONMENTAL EFFECTS OF PHOTOSENSITIVE MATERIALS.
Technical rept. for Jun 62-Jul 64,
by John H. Atkinson, Jack D. Calvert, G. E. Cook, and J. F. Parham. Oct 64, 76p
Contract AF33 616 8261, Proj. 6272, Task 627203
AL TR64 274
Unclassified report

Descriptors: (*Space environmental conditions, Photographic analysis), (*Photographic recording systems, Spaceborne), Photographic materials, Cosmic rays, Van Allen radiation belt, Radiation measurement systems, Photographic emulsions, Radiographic film, Photographic images, Data processing systems, Photographic processes, Automatic, Circuits, Telemeter systems, Densimeters, Hydraulic systems, Electromechanical converters, Temperature control, Satellites (Artificial), Space probes.

The report covers the second phase effort to develop an experimental device for use in a probe or orbiting type space vehicle to collect qualitative and quantitative data on the nature and effects of space environmental radiation on gelatin-silver-halide emulsions. The flight instrumentation package to be developed will include a film supply, image processor, image data readout device, and data processing circuitry compatible with standard research vehicle telemetry. An experimental laboratory unit was developed incorporating a film processor, photo densitometer, and radiation counter which were designed for operation in a space vehicle. The operation of the unit is controlled by an electro-mechanical programmer and is capable of continuous automatic processing of a roll of film. Supporting investigations of rapid processing of selected aerial films and the results of an investigation of web processing techniques are also reported. (Author)

25. Physics

AD-607 999 Div. 25
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
MAGNETOHYDRODYNAMIC VORTICES,
by W. S. Lewellen. 31 May 60, 37p
STL/TR-60-0000-09147
Unclassified report

Descriptors: (*Magnetohydrodynamics, Vortices), (*Vortices, Magnetohydrodynamics), Plasma medium, Magnetic fields, Electric fields, Fluid flow, Reynolds number, Differential equations, Integration.

A magnetohydrodynamic body force is considered in interaction with a two-dimensional vortex in a viscous, conducting fluid. The equations governing the motion are presented and briefly discussed. Applied magnetic and electric fields are chosen in accordance with Maxwell's equations and in such a way as to yield a tangential body force. It is shown that whenever the magnetic Reynolds number based on the radial velocity component is much less than one, the tangential body force due to the induced magnetic field can be neglected in comparison with that due to the applied. For these conditions the problem reduces to that of solving a second-order, linear differential equation for the tangential velocity. Analytic solutions are found for different cases. The fundamental dimensionless parameters in each case are the Hartmann number, the Reynolds number based on the radial mass flow, and the ratio of the applied to the induced electric field. The results are plotted for reasonable values of these parameters. The effect of the applied magnetic and electric fields on the temperature and pressure distributions in a steady, axisymmetric, compressible vortex is presented. (Author)

AD-608 009 Div. 25
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
AXISYMMETRICAL BUCKLING OF RIGHT CIRCULAR CONES UNDER AXIAL COMPRESSION.
Memo. rept.,
by P. Seide. 23 Mar 55, 15p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Conical bodies, Buckling), (*Buckling, Conical bodies), Compressive properties, Loading (Mechanics), Cylindrical bodies, Differential equations, Thickness.

Timoshenko's method of derivation is used in deriving equations for axisymmetrical buckling of right circular cones under axial compression.

AD-608 015 Div. 25
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Canoga Park Calif.
RAMO-WOOLDRIDGE GENERAL RESEARCH PROGRAM, 1959. C. ALTERNATING FIELD SUSPENSION SYSTEM.
Progress rept.,
by R. F. Wuerker, J. C. Slattery, H. C. Corben, L. M. Frantz, and R. W. Fredricks. 1 Mar 60, 14p
Unclassified report

Descriptors: (*Charged particles, Control), Dust, Ions, Electrons, Electromagnetic fields, Electric fields, Particle trajectories, Plasma medium, Alternating current, Oscillation, Motion, Equations.

Research was performed on the three-dimensional containment of charged dust particles, ions, and electrons by means of oscillating electric and electromagnetic fields.

AD-608 018 Div. 25
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
RAMO-WOOLDRIDGE GENERAL RESEARCH PROGRAM, 1959. F. STUDIES OF BOILING HEAT TRANSFER.
Progress rept.,
by Novak Zuber, Gorden C. K. Yeh, and H. C. Corben. 1960, 10p
Unclassified report

Descriptors: (*Heat transfer, Nucleate boiling), (*Nucleate boiling, Heat transfer), Hydrodynamics, Vaporization, Bubbles, Velocity, Temperature, Boundary layer, Equations.

An analytical expression, in terms of the bubble population, was derived for the velocity of the liquid adjacent to the heating surface. This velocity was used to estimate the heat transfer in nucleate boiling. Experimental data indicate that when bubbles can be considered as isolated, then the heat transfer in nucleate boiling is intermittent and bears a similarity to the transfer of heat from a flat plate with boundary layer formation. Experimental data indicate also that as the vapor void fraction (vapor hold-up) on the heating surface increases there occurs a change in the hydrodynamic conditions of the two-phase system. This change occurs at a heat flux density well below the critical heat flux. The vapor removal is altered from an intermittent to a continuous process. The mechanism of heat transfer is affected but not the process.

AD-608 022 Div. 25
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
RAMO-WOOLDRIDGE GENERAL RESEARCH PROGRAM, 1959. D. MASERS AND PARAMETRIC AMPLIFIERS.
Progress rept.,
by H. C. Corben, L. M. Frantz, B. Hamermesh, and R. F. Wuerker. 1 Mar 60, 10p
Unclassified report

Descriptors: (*Masers, Field theory), (*Parametric amplifiers, Field theory), (*Field theory, Amplifiers), Electron beams, Magnetic fields, Electric fields, Electron tubes, Electrostatics, Quantum mechanics.

A progress report on the research on electron beam amplifier tubes and the theory of electron spin.

AD-608 025 Div. 25, 12
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
TRANSVERSE WAVE PROPAGATION IN A SOLID, ELASTIC MASS CONTAINED BY AN INFINITELY LONG, RIGID CIRCULAR-CYLINDRICAL TANK,
by J. H. Baltrukonis and W. G. Gottenberg.
20 Mar 59, 40p STL/TR-59-0000-00623, STL/EM-9-6
Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Cylindrical bodies, Vibration), Elasticity, Solids, Tanks (Containers), Rocket motors (Solid propellant), Dynamics, Mathematical analysis, Graphics.

Dispersion equations are derived for the propagation of transverse waves along the axis of a solid, circular cylinder contained by an infintely long, circular-cylindrical tank. The tank and core are assumed welded at their interface. At least four dispersion curves are plotted for each of the first four orders and for two different values of Poisson's ratio. It is pointed out that each dispersion curve is associated with either transverse vibrations or the thickness-shear vibrations, and mode shapes are considered on this basis. (Author)

AD-608 031 Div. 25, 4, 10, 12
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
FLAME ION CONFERENCE AT PRINCETON, OCTOBER 12-13, 1959,
by J. H. Gardner and Paul Molmud. 1 Dec 59, 27p
STL/7320.3-130

Unclassified report

Descriptors: (*Flames, Symposia), (*Gas ionization, Flames), Mass spectroscopy, Probes (Electromagnetic), Plasma medium, Exhaust flames, Flame propagation, Radar interference, Guided missiles,

Summaries are given of papers presented at the conference.

AD-608 033 Div. 25
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
FREE TRANSVERSE VIBRATIONS OF AN INCOMPRESSIBLE ELASTIC MASS CONTAINED BY AN INFINITELY LONG, RIGID, CIRCULAR-CYLINDRICAL TANK,
by J. H. Baltrukonis. 29 Oct 59, 24p
STL/TN-59-0000-00329, STL/EM-9-24

Unclassified report

Descriptors: (*Elasticity, Cylindrical bodies), (*Cylindrical bodies, Vibration), Solids, Elastic shells, Oscillation, Dynamics, Equations, Mechanics, Theory, Mathematical analysis.

Natural circular frequencies of free transverse vibrations of an incompressible elastic mass contained by an infinitely long, rigid, circular-cylindrical tank are obtained as exact solutions of the equations of elasticity. Frequency coefficients are tabulated for solid and hollow cores and for, at least, four frequencies in each of the first four modes of vibration. (Author)

AD-608 039 Div. 25
OTS Prices: HC $1.00/MF $0.50

Israel Inst. of Tech., Haifa.
ENERGY-MOMENTUM TENSORS.
Scientific rept. no. 9,
by A. Peres. 11 Aug 64, 6p
Grant AF EOAR64 20
ARL 64 227

Unclassified report

Descriptors: (*Mass-energy relation, Tensor analysis), (*Relativity theory, Mass-energy relation), (*Tensor analysis, Mass-energy relation), Partial differential equations, Transformations (Mathematics), Quantum mechanics.

It is shown that the canonical energy-momentum quasi-tensor differs from the metric energy-momentum tensor density by a complete divergence. Therefore both expressions give the same value for the total energy and momentum of a closed physical system. (Author)

AD-608 045 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AN APPARATUS FOR OBTAINING PLASMA AND STUDYING ITS PROPERTIES,
by A. E. Sheindlin and E. I. Asinovskii. 14 Oct 64, 13p
FTD TT64 812; TT 64 71661

Unclassified report

Unedited rough draft trans. of unidentified mono. pub. by Nauchno-Issledovatel'skii Institut Vysokikh Temperatur, Moscow, 1963, 5p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma medium, Electric arcs), (*Electric arcs, Plasma medium), Electric discharges, Stabilization, Copper, Cooling, Plasma jets, Argon, Gas ionization, Spectroscopy, USSR.

Described is an electric arc stabilized by means of cooled copper walls. Consideration is given to some characteristics of an arc in the presence of activity on argon, including evidence that with currents of the order of 50 - 60 a, temperatures on the axis of discharge reach 11000-12000 degrees Kelvin. (Author)

AD-608 064 Div. 25, 26
OTS Prices: HC $3.00/MF $0.75

Spectrolab, Sylmar, Calif.
DESIGN AND FABRICATION OF OPTICAL FILTERS FOR LASER FREQUENCY.
Rept. for Feb 63-Jul 64,
by Samuel J. Holmes and Noel E. Bowman. Oct 64, 72p
Contract AF33 657 9216, Proj. 5244, Task 524402
AL TDR64 268

Unclassified report

See also AD-427 005.

Descriptors: (*Optical filters, Mica), (*Lasers, Optical filters), Narrowband, Coherent radar, Optics, Ruby, Filters (Electromagnetic wave, Manufacturing methods, Performance (Engineering), Environmental tests.

Theoretical aspects, production methods, and evaluation techniques of narrow band optical filters, which employ a thin sheet of mica in place of the usual evaporated dielectric spacer layer, are described. Such filters have been made and are reported with half-widths of less than 2 A and with transmission on the order of 60%. In particular, details are given of the method of cleaving the mica sheets and the measurement of absorption. A filter holder is described which makes it possible to construct filters of practical size. Theoretical and experimental values are given for the angular sensitivity. Other properties discussed are the tunability, background, the spectral region for which they can be constructed, and the stability of the filters with time and with temperature changes. Recommendations for future work with such narrow band optical filters are presented and continuation of the program is recommended. (Author)

AD-608 073 Div. 25, 1, 13
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ., Columbus. Research Foundation.
LIFE ESTIMATE OF FATIGUE SENSITIVE STRUCTURES.
Rept. for 1 Jul 63-31 Jul 64,
by A. M. Freudenthal. Sep 64, 13p
Contract AF33 657 8741, Proj. 7351, Task 735106
ML TDR64 300

Unclassified report

Descriptors: (*Structures, Life expectancy), (*Fatigue (Mechanics), Structures), Mathematical prediction, Metals, Statistical analysis, Load distribution, Failure (Mechanics), Safety, Analysis.

By defining fatigue failure as an ultimate load failure of a structure damaged in fatigue by operational loads, the estimate of fatigue life can be reduced to that of a mean return period of an ultimate load type of failure for which statistical methods of safety analysis have already been developed. By applying such methods in conjunction with a simple fatigue damage function the fatigue sensitivity of a structure can be evaluated in terms of the ratio of the return periods of fatigue failure and ultimate load failure. (Author)

AD-608 079 Div. 25, 9
OTS Prices: HC $7.40/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROBLEMS OF HEAT TRANSFER AND HYDRAULICS OF TWO PHASE MEDIA (COLLECTION OF ARTICLES), ed. by S. S. Kutateladze. 31 Aug 64, 437p
FTD MT64 271; TT 64 71684

Unclassified report

Edited machine trans. of mono. Voprosy Teplootdachi i Gidravliki Dvukhfaznykh Sred: Sbornik Statei, Moscow/Leningrad, 1961, 329p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fluid flow, Mixtures), (*Heat transfer, Boiling), Condensation, Phase studies, Thermodynamics, Motion, Liquids, Gases, Pressure, Boiler tubes, Reports, Pipes, USSR.

The collection consists of articles expounding the results of a significant number of investigations in the region of heat exchange during boiling and condensation and on the hydraulics of liquid-gas mixtures.

AD-608 080 Div. 25, 4
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HERALD OF LENINGRAD UNIVERSITY, 1963, VOL. 18, NO. 10, PHYSICS AND CHEMISTRY SERIES, NO. 2., 29 Sep 64, 222p
FTD MT64 65; TT 64 71682

Unclassified report

Edited machine trans. of Leningrad Univ. Vestnik (USSR) 1963, v. 18, no. 10, Seriya Fiziki i Khimii, no. 2, p. 1-147.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Crystals, Scientific research), (*Physical chemistry, Scientific research), Particles, Harmonic oscillators, Films, Crystallization, Spectroscopy, Physical properties, Chlorides, Organic compounds, Dyes, Solid solutions, Indium alloys, Antimony alloys, Glass, Chemical analysis, USSR.

Articles are presented on the following topics: Hartree-Fock equations for non-metallic crystals; theory of slow collisions of heavy particles; magnetic susceptibility of a harmonic oscillator; structure of band edge absorption in cuprit; complex momenta and potentials with repulsive core; properties of polycrystalline films (AgI); investigation of dye-stuff crystallization processes; intensity and half-width of spectral lines in a band described by the elasser model; fundamental equations and mean surface tension of the monocrystal; thermodynamic properties or the AgCl-NaCl-PbCl2 system; chemical potentials and activity coefficients of the components of binary solid solutions; dissociation constant of methyl orange; electrolytic precipitation of antimonous indium; dissolving glasses in solutions of caustic soda; photometric determination of iron in the ultraviolet spectrum; obtaining 2,4-dinitrophenylhydrazones and their identification; nuclear excitation of Si31; transient response in the ladder-type low-pass filter with loss; dissolution of arsenide-selenide glasses and the glassy system As--S--Tl; stabilization of polyacetaldehyde.

AD-608 087 Div. 25, 6
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
LASER VELOCIMETRY.
Master's thesis,
by Philip C. Staas, Jr. Aug 64, 63p
AFIT GE/EE/64-18

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Velocity, Measurement), (*Lasers, Reflection), (*Detectors, Lasers), Measurement, Photomultipliers, Diffraction, Diffraction gratings, Electromagnetic waves, Monitors.

Laser velocimetry is the measurement of transverse velocity by detection of motion in reflected laser radiation. Reflections from a diffuse surface form a diffraction field which moves in space as the surface moves. A photomultiplier and optical grating detect the diffraction field motion as a frequency spectrum. The center frequency of the detector output is equal to the velocity of the diffraction field divided by two times the width of one grating line. The diffraction field velocity is a linear function of reflecting surface velocity and detector range and a non-linear function of incident laser radiation wavefronts. (Author)

AD-608 093 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORY OF NON-EQUILIBRIUM IONIZATION IN WET ALKALI METAL VAPORS-CONTINUOUS CHANGING MODEL.
Technical Information Series,
by John M. Smith. Oct 64, 32p R64SD70
Contracts AF33 657 8298, AF49 638 914

Unclassified report

Descriptors: (*Alkali metals, Vapors), (*Ionization, Alkali metals), (*Magnetohydrodynamics, Alkali metals), Electrons, Gases, Atoms, Ions, Plasma physics,

Absorption, Electron density, Temperature, Thermodynamics, Electrical conductance, Drops, Electric field, Theory, Thermionic emission, Statistical mechanics, Mathematical analysis.

A theory for non-equilibrium ionization in wet alkali metal vapor is formulated. The media is considered to consist of electrons, neutral gas atoms, positively charged atomic ions, and charged vapor droplets. The degree of ionization of the gas atoms is assumed to be given by Saha's Law evaluated at the electron temperature while the degree of charging of the vapor droplets is obtained by equating the random electron current in the gas to the thermionic emission current of the vapor droplet at its internal temperature. The electron temperature is determined by equating the Joule heating rate of the electrons to their rate of energy loss due to elastic electron-atom, electron-ion, and electron-droplet collisions and inelastic electron-droplet collisions. The droplet internal temperature is determined by equating the rate of droplet heating due to electron bombardment to the rate of cooling due to atom and ion bombardment. The above theory is applied to MHD generator considerations for which the predominate effect of the droplets is found to be the absorption of free electrons from the system accompanied by an increase in magnetic field requirements. The depression of electron density is found to be most severe at high percent moisture and for small droplets. (Author)

AD-608 102 Div. 25, 2, 8
OTS Prices: HC $5.00/MF $1.00

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
LECTURE NOTES ON A COURSE ON WAVE PROPAGATION IN INHOMOGENEOUS MEDIA.
Scientific rept.,
by O. E. H. Rydbeck. 1 Aug 64, 160p IRL-215
Contract AF19 628 4014; Grant NSF G18983,
Proj. 8605, Task 860502
AFCRL 64 636
Unclassified report

Descriptors: (*Ionospheric propagation, Mathematical analysis), Propagation, Electromagnetic waves, Sound, Wave transmission, Electromagnetic wave reflections, Numerical analysis, Differential equations.

The objective of this course was to introduce the graduate student to some of the more important methods used in analyzing the propagation of waves in inhomogeneous media. Since the basic methods are the same, whether one deals with electromagnetic waves, or, say, sound waves, the material of this course was presented with very limited reference to any particular physical wave type. The emphasis was on generality rather than on specialty. (Author)

AD-608 111 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ., Columbus. Research Foundation.
A SEARCH FOR ISOTOPIC PHASE SEPARATION IN H2-D2 MIXTURES.
Technical rept. no. 13,
by E. M. deCastro, D. Husa, J. R. Gaines, and J. G. Daunt. Oct 64, 17p OSURF-989-13
Contract Nonr495 20, Projs. NR018, 412, 989
Unclassified report

Descriptors: (*Hydrogen, Nuclear magnetic resonance), (*Deuterium, Nuclear magnetic resonance), Isotopes, Phase studies, Separation, Transformations, Line spectrum, Molecular properties, Cryogenics.

It was found that the n.m.r. data in H2-D2 mixtures can be accounted for adequately by extrapolation of the properties of the pure components. In particular the composite resonance lines are characteristic of a hindered rotator and no concrete evidence for isotopic phase separation was found. Although phase separation may be favored energetically below 4K, the diffusion rates are so small that the time required to produce observable domains can be extremely long. (Author)

AD-608 112 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ., Columbus. Research Foundation.
OBSERVATION OF THE LAMBDA ANOMALY IN SOLID D2 BY NUCLEAR MAGNETIC RESONANCE.
Technical rept. no. 14,
by J. R. Gaines, E. M. de Castro, and D. White.
Oct 64, 14p OSURF-989-14
Contract Nonr495 20, Projs. NR018 412, 989
Unclassified report

Descriptors: (*Deuterium, Nuclear magnetic resonance), (*Solidified gases, Deuterium), Phase studies, Transformations, Line spectrum, Molecular properties, Transition temperature, Cryogenics.

Nuclear resonance studies were made of enriched para D2 samples (with concentration of about 80%) and the splitting of the resonance line in D2 below 2K was observed. A derivative of the resonance line at 4.2K was obtained with a sample containing 81% pD2. This line is actually a superposition of lines arising from molecules with I=2 (orthoD2) and I=1 (para D2). Since the molecules with I=2 have J=0 at these low temperatures, it is not expected that quenching of rotation will have any effect on their contribution to the resonance line, in a first approximation. Reduction of the temperature to about 2.2K revealed the existence of side peaks split apart by (76.8 ± 0.5) kc/sec. The calculated value of the splitting is in excellent agreement with the experimental value. After the splitting of the line occurred, several other effects were observed: (i) the signal to noise ratio deteriorated rather badly, (ii) the line became so asymmetric that the recorder trace bore little resemblance to the conventional derivative curve, and (iii) the remnant central line became noticeably broader, with a width of 5-8 gauss.

AD-608 117 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

Institute of Field Physics, Univ. of North Carolina, Chapel Hill.
JOINT REPORT TO AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND OFFICE OF NAVAL RESEARCH.
Rept. for 1 Dec 63-30 Nov 64,
by Bryce S. DeWitt. 30 Nov 64, 12p
Contract Nonr855 07; Grant AF AFOSR153 63,
Proj. NR013 102
Unclassified report

Descriptors: (*Armed forces research, Reports), (*Physics, Scientific research), Abstracting, Relativity theory, Quantum mechanics, Gravity, Statistical analysis, Particles.

Contents: On the conceptual basis and use of invariance principles; Interactions of a scalar field with gravitational field; Machine computation of modified Einstein equation; On the quantum theory of macroscopic bodies; A resonance model for E(+)-K(+) production.

AD-608 120 Div. 25
OTS Prices: HC $2.00/MF $0.50

McMaster Univ., Hamilton (Ontario).
THE MECHANICS OF IRON INHIBITION DURING DISSOLUTION OF LITHIUM FLUORIDE CLEAVAGES.
Technical rept. no. 3,
by Marjorie S. Baskin and M. B. Ives. Sep 64, 34p
Contract Nonr3925 00

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-600 328.

Descriptors: (*Iron compounds, Adsorption), (*Lithium compounds, Fluorides), (*Single crystals, Lithium compounds), Inhibition, Surfaces, Chlorides, Iron, Crystal lattice defects, Etched crystals.

Radiotracers of iron are used to obtain adsorption isotherms for iron adsorbed on lithium fluoride surfaces from dilute solutions of ferric chloride. The isotherms are related to the observed etch morphologies and substantiate the argument that the condition for good crystallographically defined etch features is achieved by 'monokink' adsorption of iron on the surface. Two distinct mechanisms are proposed for the effect of iron on the morphologies. At low iron concentrations the adsorption of iron at kinks is rate controlling, but at higher concentrations diffusion control becomes increasingly dominant. It is suggested that the diffusion barriers are increased by ferric ion complexes in solution. Isotherms determined under the steady state conditions provided by solutions saturated with lithium fluoride are more reproducible and applicable to adsorption theories than those determined from etchants. Beta-track autoradiography and low-background counter methods are compared. (Author)

AD-608 137 Div. 25, 8
OTS Prices: HC $6.00/MF $1.25

Delco Radio Div., General Motors Corp., Kokomo, Ind.
NON-DESTRUCTIVE RELIABILITY SCREENING OF ELECTRONIC PARTS.
Final rept.,
by J. R. Bevington and L. V. Ingle. Sep 64, 247p
Contract AF30 602 2972, Proj. 5519, Task 551902
RADC TDR64 311

Unclassified report

Descriptors: (*Semiconductors, Reliability (Electronics)), (*Non-destructive tests, Transistors), (*Transistors, Non-destructive tests), Germanium, Diodes (Semiconductor), Voltage, Degradation, Stresses, Noise, Failure (Mechanics), Test methods, Programming 9computers), Mathematical prediction.

An extensive study of the relationship of a large number of parameters to later failure was made for germanium, high power, PNP, alloy junction transistors. The relative effectiveness of several screening approaches were tested and applications to several related device types were made to extend the applicability. A reliability screening technique which uses the time response characteristic after step application of rated diode voltage was developed. A study of the mechanism of collector diode degradation failure resulted in the establishment of a model for the mechanism of failure. A computer program was developed and is described. This program will analyze up to ninety-six measured and calculated parameters for a single experiment and establish their relative effectiveness for reliability prediction when the data cards representing later failures in the initial test decks are suitably coded. The output of this program yields a series of optimized multiparameter truncation screening plans with increasing percent removal of failures. (Author)

AD-608 143 Div. 25, 17
OTS Prices: HC $1.00/MF $0.50

Cornell Univ., Ithaca, N. Y.
EFFECT OF ELECTRON-PHONON INTERACTION ON ELECTRONIC SPECIFIC HEAT OF SIMPLE METALS,
by N. W. Ashcroft and J. W. Wilkins. Oct 64,
11p
Contract Nonr401 38

Unclassified report

Supported in part by the Air Force Office of Scientific Research, Washington, D. C. and the National Academy of Sciences-National Research Council, Washington, D. C.

Descriptors: (*Metallic crystals, Quantum mechanics), (*Sodium, Specific heat), (*Aluminum, Specific heat), (*Lead, Specific heat), Electrons, Phonons, Green's function, Crystal lattices, Atomic energy levels, Cyclotron resonance phenomena.

The quantitative importance (almost dominance) of the electron-phonon interaction in the deviation of the electronic specific heat from the free electron value in simple metals is reported. Only the metals Na, A1 and Pb were considered since for them (i) The band structure and the Fermi surfaces are relatively well known and (ii) The phonon dispersion curves have been measured. With this knowledge the calculations are performed with no adjustable parameters.

AD-608 145 Div. 25, 4, 30
OTS Prices: HC $1.00/MF $0.50

Royal Holloway Coll., Univ. of London (England).
VERY LOW-FREQUENCY INFRA-RED SPECTROSCOPY.
Annual technical status rept. no. 3, 1 Oct 63-1 Oct 64,
by Arthur Finch and D. Steele. 1 Oct 64, 9p
Contract N62558 3030, Proj. NR051 434

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Infrared spectroscopy, Very low frequency), (*Infrared spectrophotometers, Design), (*Spectra (Infrared), Chemical compounds), Sulfur compounds, Cyanides, Boron compounds, Halides, Cyclopentanes, Metalorganic compounds, Tin compounds, Amines.

One major alteration has been made to the low frequency infrared spectrometer described in a previous report. Because two motors had burned out driving the chopper, the drive system was redesigned, bringing it out of the vacuum chamber. The present drive is through a flexible coupling, an Edwards vacuum rotary seal, and a bevelled gear. A one and one-half meter gas cell has been designed, its primary design features being simplicity and the ability to increase the optical path length several fold by multiple reflection. Measurements of spectra in the far infrared are reported for the following compounds: sulfur dicyanide, boron tribromide, boron triiodide, azulene, boron fluoride (B2F4), and tetrakis (dimethylamino) diboron. Spectral frequencies observed for a series of cyclic organo tin compounds are also reported.

AD-608 149 Div. 25, 8
OTS Prices: HC $7.00/MF $1.50

Minnesota Univ., Minneapolis. Physical Electronics

Research Lab.
RESEARCH IN PHYSICS OF ELECTRON EMISSION AND ELECTRON TUBE TECHNOLOGY.
Interim rept. no. 4, 16 Apr-15 Oct 64,
ed. by D. E. Anderson, A. B. Laponsky, and W. T. Peria.
15 Oct 64, 322p
Contract AF33 657 10475, Proj. 4156, Task 415605
Unclassified report

See also AD-439 716.

Descriptors: (*Electrons, Secondary emission), (*Electron tubes, Scientific research), Single crystals, Photoelectric effect, Thermionic emission, Thin films (Storage devices), Superconductivity, Diodes (Electron tubes), Triodes, Tunnel diodes, Cathodes (Electron tubes), Aluminum compounds, Magnesium compounds, Barium compounds, Germanium alloys, Oxides, Electron bombardment, Electron diffraction analysis.

Further secondary emission characteristics of Al2O3 and MgO dynodes are reported. Studies of thin-film tunnel current diodes and triodes and of hot electron injection into such devices are reported. Several experiments relating to BaO, (BaSr)O and nickelate cathodes are described. Interpretations of the observed low energy electron diffraction patterns for Ge and CdF2 are given. Further results of the surface studies of the Ge:Na and C:Na systems are presented. Recent results on bombardment-induced desorption of adsorbed gases and the motivation for a new experimental tube are presented. Experiments on electron emission from superconductors are described. (Author)

AD-608 160 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 7, 16 Jun-15 Sep 64,
by R. Novick. 15 Sep 64, 94p CU-9-64-SC-90789
Contract DA36 039sc90789
Unclassified report

See also AD-603 446.

Descriptors: (*Microwaves, Scientific research), (*Microwave spectroscopy, Molecular Beams), (*Solid state physics, Microwave frequency), (*Maser, Spectroscopy), (*Lasers, Refraction), (*Ruby, Photons), (*Photons, Ruby), Irasers, Hyperfine structure, Helium, Chromium, Lithium, Calcium, Barium, Alkali metals, Radioactive isotopes, Optical properties, Lead, Nuclear magnetic resonance, Spectroscopy, Tunneling (Electronics), Rubidium, Color centers, Ammonia, Deuterated compounds, Planetary atmospheres, Atmosphere Models, X-rays, Galaxies, Radiofrequency, Polarization, Scattering, Superconductors, Klystrons, Fluorides, Lithium compounds, Sodium compounds, Ethers.

Photon echoes have been observed in ruby. An experimental program in x-ray astronomy has been initiated. The immediate goal of this work is the determination of the polarization of the recently discovered discrete x-ray sources. The method of level-crossing spectroscopy has been extended to the observation of the Stark effect. A precise measurement of the Stark shift of the 3P term of lithium has been completed. Additional metastable autoionizing atomic states have been observed in sodium and cesium. A systematic investigation of the Zeeman quenching of these states in all of the alkali elements was carried out using a new electron multiplier detector arrangement. A series of experiments were done to verify the predictions of Hartmann and Anderson on the effect of rf irradiation on an NMR line shape. (Author)

AD-608 165 Div. 25, 13
OTS Prices: HC $3.00/MF $0.75

Applied Physics Lab., JHU, Silver Spring, Md.
THE LONG PERIOD DAMPING CAPACITY OF THIN WIRES IN TORSION,
by Barry E. Tossman. Sep 64, 69p TG-596
Contract NOw62 0604c
Unclassified report

Descriptors: (*Wire, Oscillation), (*Damping, wire), Mechanical properties, Materials, Engineering, Force (Mechanics), Loading (Mechanics), Stresses, Internal friction, Elasticity, Creep, Vibration, Deformation, Theory, Special functions, Differential equations, Cadmium, Beryllium, Copper, Grain structures (Metallurgy), Experimental data.

This research investigates the torsional damping capacity of thin wires subject to long period forced oscillation. Because the periods of interest are in the order of 10 hours, the direct measurement of damping capacity is impossible. It is shown that since internal friction is a manifestation of material anelasticity, Boltzmann's Superposition Theory can be used to develop a functional relation correlating internal friction and creep. The damping capacity of several high loss wires is determined directly by (a) measuring the logarithmic decrement during one hour period free vibration and (b) measuring the deformation response phase lag during one hour period forced vibration. These values are compared to predictions derived from the creep - damping function utilizing measured creep data. On the basis of the correlation obtained, a curve of internal friction versus period of oscillation is generated. The mechanism of internal friction is attributed to viscous damping at the cadmium grain boundaries and dislocation effects. (Author)

AD-608 175 Div. 25
OTS Prices: HC $2.00/MF $0.50

Sperry Gyroscope Co., Great Neck, N. Y.
LASER MODE INTERACTION STUDIES.
Final rept.,
by S. A. Collins, Jr., C. C. Wang, and E. W. Cheatham.
Aug 64, 46p AB-1272-0021
Contract AF19 628 2924, Proj. 4645, Task 464502
AFCRL 64-701
Unclassified report

Descriptors: (*Lasers, Interferometers), (*Resonators, Optical instruments), Gallium alloys, Arsenic alloys, Mirrors, Ruby, Semiconductor devices.

Extensive analytical studies of laser modes and optical resonators led to the formulation of a general theory and graphical treatment of optical resonators with focusing elements. This published work is now expanded to include cases involving nonparallel axes of symmetry. The optical resonator theory was experimentally applied to a triangular ring optical resonator. Beat frequencies between various modes were measured. The results were in agreement with the analytically predicted frequencies. A GaAs diode laser with an external ellipsoidal mirror was analyzed and experimentally studied. Reduction of spot size is treated and the apparatus to position the diode-mirror combination is described. Dual canted Fabry-Perot mode selector etalons were experimentally studied with a ruby laser. Beam-angle narrowing in two dimension is shown. The theory of frequency selectivity and angle narrowing is reviewed. (Author)

AD-608 179 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WIDTH OF LINES, EMITTED BY LASER MODELS, by V. S. Mashkevich. 26 Oct 64, 9p
FTD TT64 841; TT 65 60003

Unclassified report

Unedited rough draft trans. of Ukrayins'kyi Fizychnyi Zhurnal (USSR) 1963, v. 8, no. 8, p. 918-921.

Descriptors: (*Lasers, Line spectrum), Electromagnetic fields, Resonance, Oscillation, Quantum statistics, Mathematical models, Partial differential equations, Kinetic theory, Helium, Neon.

The investigation of the stationary condition of a laser is approached by considering the state of the electromagnetic field as a collection of accurate normal oscillations. Solutions of Maxwell equations with approximate boundary conditions correspond to the precise resonator modes. This method offers the possibility of considering the effect of line narrowing.

AD-608 180 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MARCH TOWARD ULTRA-HIGH VACUUM, by Lin Ting. 30 Oct 64, 11p
FTD TT64 608; TT 65 60004

Unclassified report

Edited trans of K'o Hsüeh Ta Chung (Chinese People's Republic) 1963, no. 9, p. 14-15.

Descriptors: (*Vacuum, Scientific research), Vacuum pumps, Gases, Molecules, Particle accelerators, Metals, Electrons, Ionization, Cryogenics, Space environmental conditions, History, China.

The role of vacuum techniques in the many fields of science and technology is discussed. Light bulbs and electronic tubes are being evacuated; metallurgists and mechanical engineers have begun to refine and cast metals under vacuum conditions; and cold vacuum welding is being attempted. The particle accelerator, the 'heavy weapon' in the science of nuclear energy, also requires a vacuum chamber. In the age when man begins to explore the universe, vacuum techniques can make further contributions to the science of space travel. Through the attainment and utilization of vacuum, physicists have made a big step toward understanding the basic nature of vacuum. Ultra-high vacuum has now become a tool for the physicists to further the knowledge of space, matter atom and vacuum.

AD-608 183 Div. 25, 7, 8
OTS Prices: HC $3.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SEMICONDUCTOR VOLTAGE STABILIZERS, by A. I. Il'enkov, I. F. Klistorin, and V. S. Sobolev. 1 Oct 64, 59p.
FTD MT64 237; TT 65 60007

Unclassified report

Edited machine trans. of mono. Poluprovodnikovye Stabilizatory Napryazheniya, Novosibirsk, 1962, p. 1-54.

Descriptors: (*Semiconductor devices, Voltage regulators), (*Voltage regulators, Semiconductor devices), Silicon, Diodes (Semiconductor), Triodes, Thermistors, Semiconductors, Voltage, Stabilization systems, Electrical conductance, Wiring diagrams, Electronics, USSR.

Principles of action, arrangement characteristics and basic parameters of semiconductor triodes, stabilitions and thermistors in a form suitable for a wide circle of readers are described. Principles of operation of parametric stabilizers of voltage using silicon stabilitrons and semiconductor thermistors, and also compensational stabilizers using semiconductor triodes are also described. This report is intended for a wide circle of radio amateurs and participants of technical circles. It can be useful also for persons developing and servicing radiotechnical equipment. (Author)

AD-608 203 Div. 25
OTS Prices: HC $1.00/MF $0.50

Stanford Univ., Calif.
THE EFFECT OF THE EDGE CONDITIONS ON THE BUCKLING OF THIN-WALLED CIRCULAR CYLINDRICAL SHELLS IN AXIAL COMPRESSION, by Nicholas J. Hoff. Aug 64, 23p SUDAER-205
Contract AF49 638 1276
AFOSR 64 1724

Unclassified report

Prepared for presentation at the International Congress of Applied Mechanics (no. 11) Munich, German, August 30 to September 5, 1964.

Descriptors: (*Buckling (Mechanics), Structural shells), (*Structural shells, Loading (Mechanics)), Compressive properties, Stresses, Numerical analysis, Boundary value problems, Supports.

A summary is presented of recent closed-form as well as numerical solutions of the buckling problem of thin-walled circular cylindrical shells subjected to uniform axial compression. The ratio of the critical stress to the classical value of the critical stress has been calculated for nine different combinations of boundary conditions. The minimal values of theling stress ratios are for rigid end fixation and 0.5 for simple supports, while in the case of free ends the buckling stress ratio can be very small. The large effect on the buckling stress of small changes in the boundary conditions is proposed as one of the reasons for the large scatter in the results of buckling experiments. (Author)

AD-608 204 Div. 25
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
BUCKLING OF CIRCULAR CYLINDRICAL SHELLS IN AXIAL COMPRESSION, by Nicholas J. Hoff and Tsai-chen Soong. Aug 64, 78p SUDAER-204
Contract AF49 638 1276
AFOSR 64 1725

Unclassified report

Descriptors: (*Buckling (Mechanics), Structural shells), (*Structural shells, Loading (Mechanics)), Compressive properties, Stresses, Numerical analysis, Boundary value problems, Supports.

The buckling stress of axially compressed thin-walled circular cylindrical shells of finite length is derived from the classical small-deflection equations for nine possible

combinations of edge support conditions. It turns out that the effect upon the critical stress of the length-to-diameter ratio of the shell is small except in some cases when the shell is very short. On the other hand, changes in the details of the edge support can lead to reduction factors of 1/2 or less to be applied to the classical value of the critical stress.

AD-608 205 Div. 25, 15, 30
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
AUTOMATED DERIVATION AND INTEGER REPRESENTATION OF TOTAL POTENTIAL DIFFERENTIAL EQUATION EXPANSIONS FOR ASSUMED TRIGONOMETRIC SERIES WITH AN APPLICATION TO THE POST-BUCKLING BEHAVIOR OF CIRCULAR CYLINDRICAL SHELLS,
by W. A. Madsen, L. B. Smith, and N. J. Hoff.
Jul 64, 63p SUDAER-201
Contract AF49 638 1276
AFOSR 64 1726

Unclassified report

Descriptors: (*Programming (Computers), Numerical methods and procedures), (*Differential equations, Series), (*Buckling (Mechanics), Structural shells), Cylindrical bodies, Potential theory, Fourier analysis, Power series, Trigonometry.

Many problems in applied mechanics defy exact solution because of the non-linear nature of the descriptive differential equations. In such cases, a solution is often obtained through assumption of appropriate trigonometric or power series, and expansion and collection of coefficients of like trigonometric terms or powers of the variable. The resulting set of non-linear algebraic equations is then used to obtain the solution. In this paper, algorithms are presented for deriving these equations with the aid of a digital computer. The equations are then stored by means of an integer representation. A Newton-Raphson algorithm for solving the integer-form equations is also presented. The method is illustrated by re-deriving the solution for post-buckling behavior of thin-walled circular cylindrical shells under axial compression. The time required for computations is short; with a Burroughs B5000 computer the total potential expression was derived in approximately two minutes; and the major stable portion of the load-shortening curve was found in ten minutes. (Author)

AD-608 206 Div. 25, 10
OTS Prices: HC $3.00/MF $0.75

Sheffield Univ. (England).
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
Scientific rept. no. 1,
by J. Swithenbank and D. Harris. Jun 64, 65p
HIC-45
Grant AF EOAR63 101
AFOSR 64 2029

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetohydrodynamics, Electric power production), (*Combustion, Oscillation), Propulsion, Detonation waves, Pressure, Mechanical waves, Propagation, Mathematical analysis, Electrical conductance, Gases, Power equipment, Generators, Acoustic properties, Vortices, Theory.

The object of this research programme is to determine useful applications of oscillatory combustion. In particular the generation of MHD power is suggested by the high ionization obtained in a combustion wave. In the limit, a detonation wave releases all the energy of combustion in the 'oscillation' and maximum temperatures are obtained. If the wave is a travelling tangential mode, theoretical studies suggest that either strong isentropic waves or cyclic detonation waves may be formed. Calculations of the MHD power generation by such waves is presented. (Author)

AD-608 220 Div. 25, 6, 8
OTS Prices: HC $3.00/MF $0.75

Sperry Gyroscope Co., Great Neck, N. Y.
COHERENT OPTICAL ARRAY TECHNIQUES.
Interim rept. for 1 Mar-31 May 64.
Sep 64, 74p AB-1272-0016-1
Contract AF30 602 3329, Proj. 4506, Task 450608
RADC TDR64 315

Unclassified report

Descriptors: (*Optical equipment, Phased arrays), (*Phased arrays, Optical equipment), (*Lasers, Feasibility studies), Coherent radar, Solid state physics, Oscillators, Phase shift, Amplifiers, Beams (Electromagnetic), Operation, Pumping (Electronics), Continuous wave radar, Crystals, Neodymium, Calcium compounds, Tungstates, Radar.

Studies are being conducted to determine the feasibility of a coherent optical phased array system. When fully developed, such a system would not only provide increased beam power concentration on distant targets, but could also conceivably result in electronic beam steering. The over-all plan is to demonstrate feasibility by developing a subassembly consisting of a cw laser master oscillator driving two pulsed laser power amplifiers in parallel. The required phase shifters and power dividers would be incorporated to demonstrate the principles of a coherent optical phased array. The investigation is being conducted for an operating wavelength of 1.06 microns. Solid state and gas lasers are being considered for the master oscillator. Each type has been developed for fully cw operation in the vicinity of 1.06 microns. Solid state crystals have been grown, cut, polished, and coated for amplifier functions of the same wavelength. Gain of several db has been measured. (Author)

AD-608 228 Div. 25, 8
OTS Prices: HC $3.00/MF $0.50

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
PHOTOELECTRIC PHENOMENA IN TUNNEL DIODE STRUCTURES.
Final technical documentary rept. for 1 Nov 62-30 Jan 64,
by J. R. Stevenson and E. J. Scheibner. 12 Oct 64, 54p
Contract AF33 657 7867, Proj. A592
AL TDR64 103

Unclassified report

Descriptors: (*Tunnel diodes, Photoelectric effect), (*Photoelectric effect, Tunnel diodes), Metals, Dielectric properties, Electrons, Potential theory, Photoelectrons, Mathematical models, Dielectric films, Aluminum alloys, Oxides, Tantalum alloys, Ultraviolet radiation, Light, Measurement.

The purpose of this investigation is to examine the possibility of obtaining data concerning the potential barrier at a metal-dielectric interface by the measurement of the photo-response of the interface. A phenomenological

description of the barrier is described and a simple theory is developed as a tool for the analysis. The experimental approach to the problem is given and preliminary photoelectric data is presented and discussed. The current vs voltage characteristics of the thin film dielectrics are used as a control on sample characteristics. (Author)

AD-608 232 Div. 25
OTS Prices: HC $1.50/MF $0.75

Army Materials Research Agency, Watertown, Mass.
AXISYMMETRIC BUCKLING OF THIN PRESSURIZED CYLINDRICAL SHELLS UNDER AXIAL COMPRESSION,
by Jerome J. Connor, Jr. and John Campo.
Jul 64, 68p
Proj. 51601006
AMRA TR64 08

Unclassified report

Descriptors: (*Cylindrical bodies, Buckling (Mechanics)), (*Buckling (Mechanics), Structural shells), Pressure vessels, Shear stresses, Pressure, Loading (Mechanics), Elasticity, Mathematical analysis.

A theoretical and experimental investigation of buckling characteristics of thin pressurized cylindrical shells under axial compression is presented. Theoretical analyses, restricted to the case of small-finite displacements, of axisymmetric elastic as well as plastic buckling are included. General dimensionless expressions for radial displacement, principal shear stress, and unit end shortening are determined. In addition, a general relationship is established between plastic buckling load and several parameters, including that of internal pressure. For a given cylinder the experimental results indicate that increasing the internal pressure increases the buckling load as long as the buckling remains elastic. For plastic buckling, on the other hand, both the theoretical and experimental results show that increasing the internal pressure decreases the buckling load. (Author)

AD-608 250 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Dynatech Corp., Cambridge, Mass.
INVESTIGATION OF ELECTROMAGNETIC AND THERMAL EFFECTS IN SUPERCONDUCTING GENERATORS.
Quarterly rept. no. 2,
by H. W. Mooncai, C. J. Oberhauser, and J. M. Reynolds.
Oct 64, 44p Dynatech-485
Contract AF33 615 1574, Projs. 8128, WRI11, Task 812808

Unclassified report

See also AD-602 748.

Descriptors: (*Superconductors, Generators), Electrical properties, Thermal properties, Magnetic properties, Electric convectors, Heat, Measurement, Test equipment, Cryogenics.

The work during this second quarter consisted of performing test runs after shakedown tests of the thermal and electrical effects in leads test apparatus; and procurement and instruction of the heatings effects in a superconductor test apparatus. Test runs of various lead materials were conducted in both liquid nitrogen and liquid helium. The test apparatus for the heating effect in a superconductor has been built up and balanced with a dummy magnet in place of the real one. (Author)

AD-608 258 Div. 25, 4, 17
OTS Prices: HC $3.00/MF $0.75

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE USE OF SOFT X-RAYS FOR MATERIALS ANALYSIS: THE L EMISSION SPECTRA OF THE Fe GROUP TRANSITION METALS AND THEIR OXIDES.
Rept. for May 63- Jun 64,
by David W. Fischer. Sep 64, 60p
Proj. 7367, Task 736702
ML TDR64 263

Unclassified report

Descriptors: (*X-ray spectroscopy, Transition elements), (*Transition elements, X-ray spectra), Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Oxides, Lines spectra, Band spectra, Atomic orbitals, Excitation, Valence, Atomic properties, Spectrum analyzers, Crystals, Standards, Counting methods.

A new analytical technique for determining the oxidation state of crystalline or amorphous oxide films of the first series transition metals was developed. This technique makes use of the soft X-ray L emission spectra of these metals and their oxides. A detailed study was made of the wavelengths, intensities and band shapes and the changes which occur in them when going from pure metal to various states of oxidation. The dependence of the L-II/L-III intensity ratio an excitation potential, valence state and atomic number is also presented as are the optimum peak to background conditions. Results were obtained using a flat crystal vacuum spectrometer with electron excitation and an ultra-thin window flow proportional counter. Crystals used were gypsum, mica, potassium acid phthalate (KAP) and rubidium acid phthalate (RbAP) with AlK alpha sub 1, 2 and AlK alpha sub 3, alpha sub 4 satellite doublet from Al2O3 as wavelength standard. (Author)

AD-608 264 Div. 25
OTS Prices: HC $3.00/MF $0.75

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
STRESSES ABOUT A CIRCULAR HOLE IN A CYLINDRICAL SHELL.
Technical rept. no. 21,
by Peter Van Dyke. Sep 64, 62p
Contract Nonr1866 02

Unclassified report

Descriptors: (*Structural shells, Stresses), (*Cylindrical bodies, Stresses), Loading (Mechanics), Boundary layer, Differential equations, Series, Numerical methods and procedures, Pressure, Rings.

The effects of a circular hole on the initial states of uniform stress produced by loading an infinite shallow cylindrical shell by axial tension, internal pressure, and torsion are determined. The linear equations for a thin, shallow cylindrical shell are reduced to a single complex differential equation involving the dimensionless curvature parameter beta. The solution to this equation is written as an infinite series, and a numerical collocation procedure is used to obtain the stresses in the shell for values of beta up to 4. Boundary layer techniques are employed to obtain approximations of the stresses for large values of the parameter beta. (Author)

AD-608 273 Div. 25
OTS Prices: HC $4.00/MF $0.75

Delaware Univ., Newark.
CHARACTERISTIC FIELD INHOMOGENEITIES IN HOMOGENEOUS DIELECTRICS IN THE PRE-BREAKDOWN RANGE.
Technical rept. no. 1,

by K. W. Boer. Sep 64, 114p
Contract DA31 124ARO D173
AROD 4461 1

Unclassified report

This rept. also includes: THE EFFECTS OF INFRARED AND ULTRAVIOLET RADIATION ON LAYER-LIKE FIELD DISTRIBUTIONS IN CADMIUM SULFIDE, by James Ralph Green. Final rept. (Master's thesis). Jun 64.

Descriptors: (*Dielectrics, Crystals), (*Cadmium compounds, Sulfides), Electric fields, Ultraviolet radiation, Infrared radiation, Excitation, Crystal lattices, Conductivity, Impurities, Electrical properties, Optical properties, Sensitivity, Voltage, Electron transitions, Mathematical models, Equations of state.

Layer-like field inhomogeneities can form in CdS at high field strengths. By simultaneously illuminating CdS crystals with visible light near the absorption edge and with infrared or ultraviolet radiation it is possible to visually observe the effects of infrared and ultraviolet excitation on the layer-like field inhomogeneities. Photographs are presented which show that the layer-like field inhomogeneities can be either created or destroyed by infrared and ultraviolet illumination, depending upon the intensity and distribution of the radiation. In order to describe the effects of infrared and ultraviolet excitation on field inhomogeneities a discussion is given of some of the previously published reports, including a reaction-kinetic model, concerning the electrical and optical properties of CdS. The experimental results are shown to agree with those predicted by the reaction-kinetic model. (Author)

AD-608 278 Div. 25
OTS Prices: HC $5.00/MF $1.00

Cruft Lab., Harvard Univ., Cambridge, Mass.
PARAMAGNETIC RELAXATION OF SOME RARE-EARTH IONS IN DIAMAGNETIC CRYSTALS,
by Chao-Yuang Huang. 4 Aug 64, 182p Cruft-TR-452
Contract Nonr1866 16, Proj. NR372 012

Unclassified report

Descriptors: (*Rare earth elements, Paramagnetic resonance), (*Paramagnetic resonance, Relaxation time), (*Crystal lattices, Impurities), Europium, Holmium, Neodymium, Samarium, Terbium, Ytterbium, Nuclear spins, Atomic orbitals, Phonons, Calcium compounds, Fluorides, Garnet, Lanthanum compounds, Sulphates, Anisotropy.

The pulsed saturation method at 8.9 kMc/sec was used to measure the spin-lattice relaxation rate 1/T sub 1 for Eu(2+), Ho(2+), and Tm(2+) in CaF2, for Yb(3+) in YGG, YA1G, and LGG, for Nd(3+) in YGG and YA1G, and for Sm(3+) in lanthanum ethyl sulphate at low temperatures. Besides the expected direct, Orbach, and Raman processes, a process, 1/T sub 1 varies as T to the 5th power, was observed for Eu(2+) in CaF2 in the temperature region 15K <T <30K. A pronounced anisotropy in T sub 1 for Sm(3+) in LES was also observed. The experimental data are in satisfactory agreement with the theoretical predictions based on the combined Van Vleck-Orbach theory. (Author)

AD-608 299 Div. 25
OTS Prices: HC $4.00/MF $1.00

American Optical Co., Southbridge, Mass.
GRADIENT DENSITY SUNGLASSES.
Final rept. for Aug 62-Apr 64,
by Helen Jupnik. Oct 64, 130p
Contract AF33 657 9681, Proj. 6337, Task 633702
SEG TDR64 50

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Eyeglasses, Optical filters), (*Optical filters, Eyeglasses), Solar radiation, Absorption, Filters (Electromagnetic wave), Lenses, Optical coatings, Titanium compounds, Magnesium compounds, Fluorides, Oxides, Optics, Tests, Data.

This report details the effort expended on design, fabrication and delivery of 91 pairs of Gradient Density Sunglasses. Lenses having a neutral absorbing base with a nominal density of 0.52 and lenses having a clear base were coated with a gradient layer of titanium suboxide and antireflected by a uniform film of magnesium fluoride to produce neutral gradient density sunglasses. Within acceptable limits, the density varied linearly from about that of the uncoated substrate at the bottom of the lens to 2.5 ± 0.3 at the top of the lens. The coatings were deposited on the concave surface of all lenses, and the contra-ocular surface remained uncoated. The back reflectance measurements that were made on a number of lenses averaged the reflectance over an area 12 mm in diameter. The reflectance minima measured varied from 1% to 3% over the various areas of lenses from different production cycles, and if the minimum was located between 500 and 600 millimicrons, the reflectance could rise to about 8% at 400 millimicrons and 6% at 750 millimicrons. The coatings passed the JAN-F-675 abrasion test and the specified scotch tape test. (Author)

AD-608 311 Div. 25
OTS Prices: HC $3.00/MF $0.75

North Carolina State Coll., Raleigh.
School of Engineering.
DYNAMICS AND THERMODYNAMICS OF VISCOELASTIC MEDIA,
by P. H. McDonald, Jr. Oct 64, 60p
Contract DA01 009ORD991

Unclassified report

Descriptors: (*Viscoelasticity, Thermodynamics), (*Continuum mechanics, Viscoelasticity), Dynamics, Partial differential equations, Tensor analysis, Heat transfer, Entropy, Differential geometry.

AD-608 312 Div. 25, 15
OTS Prices: HC $2.00/MF $0.50

North Carolina State Coll., Raleigh. School of Engineering.
THE M INTEGRAL OPERATOR: AN APPLICATION OF THE CAUCHY-HOBSON THEORY TO THE SEMI-INFINITE MEDIUM,
by P. H. McDonald and G. A. Myers. Oct 64, 26p
Contract DA01 009ORD991

Unclassified report

Descriptors: (*Elasticity, Theory), (*Boundary value problems, Elasticity), (*Operators(Mathematics), Integrals), Continuum mechanics, Mechanical properties, Loading (Mechanics), Potential theory, Special functions (Mathematical), Harmonic analysis.

A classical problem in the theory of elasticity for which a general solution has been found is that of the semi-infinite elastic solid. Cerruti and Boussinesq were the first to consider a problem where such a region was employed as the vehicle for exposing the boundary value problems of this theory. Specifically, it is assumed that

all of the space on one side of a plane is occupied by an ideal elastic continuum, and either the surface displacements or the surface tractions on the bounding plane are prescribed. Since the problem can be formulated in terms of displacements for either case of prescribed surface loading, the problem reduces to finding functions to represent the displacements, and which satisfy the equations of equilibrium at all points within the medium and known conditions on the bounding surface.

AD-608 324 Div. 25, 8, 14
OTS Prices: HC $3.00/MF $0.75

Clevite Corp., Cleveland, Ohio.
THE STRUCTURE OF VARIOUS FERROELECTRICS: THE QUESTION OF FERRIELECTRICITY,
by William R. Cooke, Jr. Sep 64, 74p
Contract AF33 615 1227, Proj. 7031, Task 703101
AL TDR64 265

Unclassified report

Descriptors: (*Ferroelectric crystals, Phase studies), (*Sodium compounds, Niobates), (*Lead compounds, Zirconates), (*Potassium compounds, Phosphates), Ferroelectricity, Antiferroelectricity, Solid solutions, Crystal substructure, Atomic properties, Solubility, Transformations, Thermal expansion.

The phase relations in the vicinity of sodium niobate and lead zirconate are reviewed, with special attention to the changes of these relations as a result of field, temperature, and pressure. It is seen that the intimate association of ferroelectricity and antiferroelectricity in these two materials gives rise to a large number of complicated phase relations. The phases present in the KH2PO4 structure type are also summarized, with particular attention to solid solutions. (Author)

AD-608 335 Div. 25, 14
OTS Prices: HC $5.00/MF $1.00

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
X-RAY DIFFRACTION MICROSCOPY OF IMPERFECTIONS IN SEMICONDUCTOR CRYSTALS.
Final rept.,
by G. H. Schwuttke. Apr 64, 168p
GTEL-TR-64-302.15
Contract AF19 604 7313, Proj. 4608
AFCRL 64 542

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*X-ray diffraction analysis, Semiconductors), (*Semiconductors, X-ray diffraction analysis), (*Semiconductors, Crystal lattice defects), (*Crystal lattice defects, Semiconductors), Crystals, Microscopy, Silicon, Diamond, Crystal structure, Epitaxial growth, Oscillators, Goniometers, Stereoscopic photography.

Three techniques have been perfected: (1) high-intensity x-ray diffraction microscopy by extinction contrast, (2) x-ray diffraction microscopy through scanning oscillator technique, and (3) direct observation of imperfections in semiconductor crystals through anomalous transmission of x-rays. In type I diamonds, long-range strain fields were found to be the dominating imperfection, and dislocations appeared to be closely related to strain centers. Type II diamonds showed a much higher density of edge dislocations with Burgers vectors in (111) planes. The investigations on silicon led to the detection of several new crystal defects not previously known to occur in silicon. It was found that silicon crystals of zero dislocations may contain microstrains and large-area stacking faults. Epitaxial silicon layers were extensively investigated. Defect structures on epitaxial silicon were identified as stacking faults. X-ray diffraction microscopy of shallow-diffused junctions in silicon led to the discovery that diffusion of boron or phosphorus into silicon generates large numbers of crystal defects. The defects were successfully analyzed as dislocations.

AD-608 346 Div. 25, 6
OTS Prices: HC $2.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
ELEMENTS OF THE THEORY OF NONLINEAR OPTICAL PHENOMENA,
Technical note,
by J. William Foreman, Jr. Oct 64, 42p
BrownEng-R-117

Unclassified report

Descriptors: (*Optical phenomena, Theory), Lasers, Nonlinear systems, Electromagnetic fields, Vector analysis, Monochromatic light, Beams (Electromagnetic), Dielectrics, Harmonic analysis, Tensor analysis.

A brief outline of the theory of nonlinear optical phenomena was presented, together with some relevant experimental results which support the theory. After an elementary treatment of optical second harmonic generation and a discussion of the properties of the macroscopic nonlinear susceptiblity tensor, the basic equations which govern second harmonic generation were obtained. The solutions of these equations in both the phase matched and phase mismatched cases were discussed. Finally, the process of phase velocity matching in negative uniaxial crystals was discussed in detail both for second harmonic generation and sum frequency generation. The report concludes with a brief mention of some higher order nonlinear optical effects. (Author)

AD-608 347 Div. 25, 12, 14
OTS Prices: HC $4.00/MF $0.75

New Mexico Univ., Albuquerque.
AN EXPERIMENTAL DETERMINATION OF ULTRASONIC WAVE VELOCITIES IN PLASTICS AS FUNCTIONS OF TEMPERATURE.
Master's thesis,
by Ned D. Arnold. 1964, 102p

Unclassified report

Supported by the Air Force Weapons Lab., Kirtland AFB, N. Mex.

Descriptors: (*Plastics, Ultrasonic radiation), (*Ultrasonic radiation, Velocity), Measurement, Temperature, Experimental data, Nylon, Polyethylene plastics, Acrylic resins, Halocarbon plastics, Phenolic plastics, Glass textiles, Nose cones, Reentry vehicles.

A simple and practical apparatus was set up to measure longitudinal ultrasonic wave velocities. The method used to determine velocity is based on measuring the times required for ultrasonic pulses to travel through samples of different lengths. The method is capable of measuring velocities through samples of a few millimeters thickness with no more than 4% error. The velocities of longitudinal waves through several plastics have been determined over a range of temperatures that, in general, extended from room temperature up to 100C. Five of the materials studied were common plastics for which velocity-temperature curves are given. The other plastics investigated were special-purpose materials used in the

nose cones of ballistic re-entry vehicles. Velocity data for these materials is given.

AD-608 355 Div. 25, 20
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Redondo Beach, Calif.
ON THE QUANTUM FIELD THEORIES LEADING TO THE CORBEN EQUATIONS,
by Richard E. Norton. Sep 64, 46p
STL/8665-6006-RU-000
Contract Nonr3769 00, Proj. NR013 110
Unclassified report

Supported in part by STL Company Independent Research Program and the National Science Foundation, Washington, D. C.

Descriptors: (*Field theory, Equations), (*Equations, Field theory), Motion, Quantum mechanics, Quantum statistics, Momentum, Elementary particles, Particle spectra.

Formulations were presented for the second quantized versions of the field theories which lead to Corben's equations of motion. It was demonstrated that an indefinite metric is required to guarantee positive energies for all the particles, but that otherwise the theories are physically unambiguous. The number and properties of the resulting particles were studied and compared with the conclusions from previous work. Alternative formulations were also discussed. (Author)

AD-608 356 Div. 25, 15
OTS Prices: HC $3.00/MF $0.75

Applied Physics Lab., JHU, Silver Spring, Md.
METHODS FOR LOWER BOUNDS TO FREQUENCIES OF CONTINUOUS ELASTIC SYSTEMS,
by Norman W. Bazley and D. W. Fox. Oct 64,
76p TG-609
Contract NOw62 0604c
Unclassified report

Supported in part by Aeronautical Research Labs., Office of Aerospace Research, Washington, D. C., through the European Office of Aerospace Research, U. S. Air Force.
Prepared in cooperation with Institut Battelle, Geneva, Switzerland.

Descriptors: (*Elasticity, Mathematical analysis), Linear systems, Vibration, Rotation, Frequency, Beams (Structural), Continuum mechanics, Bessel functions, Statistical mechanics.

The article presents recently developed mathematical methods for the calculation of rigorous lower bounds for the frequencies of continuous linear elastic systems in free vibration. The formulation of these techniques makes them applicable to a wide class of elastic theories.

AD-608 370 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE THEORY OF LINEARITY OF HOT-CATHODE IONIZATION GAUGE,
by C. Y. Hwa. 27 Oct 64, 23p
RSIC 320; TT 65 60110
Unclassified report

Trans. of Wu Li Hsueh Pao (Chinese People's Republic) 1963, v. 19, no. 2, p. 73-82.

Descriptors: (*Ionization gages, Theory), (*Vacuum, Ionization gages), Instrumentation, Cathodes (Electron tubes), Triodes, Electric discharges, Experimental data.

The characteristic equation of the hot-cathode ionization gauge was derived from the theory of Townsend discharge. The linear theory was discussed and experimental verifications of it were given.

AD-608 378 Div. 25, 14, 15
OTS Prices: HC $3.00/MF $0.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
VARIATION OF ELASTIC MODULI.
Rept. for 30 Sep 62-24 Jun 64,
by Arfon H. Jones. Nov 64, 62p ASRL-TR-106-3
Contract AF29 601 4601, Proj. 5776
WL TR64 103
Unclassified report

Descriptors: (*Elasticity, Mathematical analysis), Thermodynamics, Statistical mechanics, Shear stresses, Strain (Mechanics), Pressure, Equations of state, Crystals, Wave transmission, Isotropism.

The variation of the bulk and shear moduli with pressure and temperature in an isotropic medium is considered. The bulk modulus can be evaluated for states at high pressure and temperature by use of the Mie-Gruneisen equation. The shear modulus follows on making additional assumptions, either that the solid exhibits a Debye frequency spectrum and a constant Gruneisen ratio and/or that the Poisson ratio is a constant. The values obtained for the shear modulus are found to be adequate for use in calculations of elastic-plastic wave propagation due to the insensitivity of the results to the variation in shear modulus. (Author)

AD-608 379 Div. 25, 20, 21, 27
OTS Prices: HC $5.00/MF $1.25

Aerojet-General Nucleonics, San Ramon, Calif.
RESEARCH IN HIGH TEMPERATURE PLASMAS FOR SPACE APPLICATIONS. VOLUME I. PHYSICS.
Annual rept.,
by Robert F. Cooper. Oct 64, 196p AN-1255
Contracts AF33 657 11183, AF33 657 12385,
Proj. 5350, Task 535001
APL TDR64 124 V1
Unclassified report

Descriptors: (*Plasma medium, Physical properties), (*Thermonuclear reactions, Control), (*Space propulsion, Plasma physics), Containment, Magnetic pinch, Magnetic fields, Stability, Spectroscopy, Ion beams, Hydrogen, Injection, Momentum, Magnetic moments, Turbulence, Geometric forms, Coils, Electric arcs, Electrodes, Liquefied gases, Pumps.

Theoretical studies show that adiabatic minimum-B geometries are flute stable at high beta. Magnetic field requirements to achieve a quadrupole adiabatic minimum-B mirror-cusp system are discussed. Theoretical and experimental investigations of the dissociative and excitative processes in energetic arcs are reported. Data of this high neutral yield and the yield of excited neutrals from an arc converter are presented including diagnostic and spectroscopic analysis. System studies include various methods of injecting and trapping excited and non-excited H(o) and H2 (+), and the trapped particle density required for burnout. A preliminary study of momentum and energy

exchange in the exhaust beam from a mirror-cusp system is presented. (Author)

AD-608 382 Div. 25
OTS Prices: HC $4.00/MF $0.75

Charged Particle Research Lab., Univ. of Illinois, Urbana.
EFFECTS OF ELECTROSTATIC FORCES ON DROP COLLISION AND COALESCENCE IN AIR,
by Hubert Russel Plumlee. 25 Sep 64, 1.6p
CPRL-8-64
Grants ARPA AMC63G2, NSF GP2528

Unclassified report

Descriptors: (*Drops, Electrostatics), (*Aerosols, Electrostatics), Viscosity, Air, Particle size, Hydrodynamics, Fluids, Electric fields, Clouds, Mathematical models.

Contents: Historical review; Theoretical model for determining collision efficiencies; Effects of electrostatic forces on the collision efficiency of a pair of drops; Theoretical aspects and experimental observations of the coalescence process.

AD-608 383 Div. 25, 13
OTS Prices: HC $1.00/MF $0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AN ASSESSMENT OF THE EFFECTIVENESS OF A VISCOELASTIC DAMPER ON THE FORCED VIBRATIONS OF A STRETCHED STRING.
Rept. for Aug-Sep 64,
by D. I. G. Jones. Oct 64, 14p
Proj. 7351, Task 735106
ML TDR64 322

Unclassified report

Descriptors: (*Damping, Structures), (*Structures, Damping), Mathematical models, Viscoelasticity, Vibration, Load distribution, Loading (Mechanics), Harmonic oscillators, Vibrators (Mechanical).

The behavior of a dynamic damper in a simple structural environment is studied. The structural model used is a stretched string under harmonic loading at the ends. The aim of the analysis is to establish conditions under which maximum damping is obtainable. The unsymmetrical modes are undamped and the analysis is concerned only with the damping of the symmetrical modes. An optimum ratio of damper stiffness to structure stiffness at the point of application of the damper is found to exist, for which the damping ratio is a maximum. For dampers much stiffer than this optimum, the antinodal point at which the damper is placed becomes more and more constrained and eventaully becomes fixed i.e. a nodal point.

AD-608 384 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
POLARIZED LIGHT STRESS INVESTIGATIONS ON TENSILE BAR WITH HOLES AND ON A RIVET HOLE,
by A. Hennig. 16 Oct 64, 26p
RSIC 315; TT 65 60115

Unclassified report

Trans. of Forschung auf dem Gebiete des Ingenieurwesens (Germany) 1933, v. 4, no. 2, p. 53-63.

Descriptors: (*Rods, Stresses), (*Stresses, Photoelasticity), Tensile properties, Shear stresses, Elasticity, Metals, Germany, Sheets, Load distribution.

The development of stress conditions in a tensile bar with holes was determined by photoelastic experiment from the theoretically tractable case of infinitely small drilled holes with increasing hole diameter. The changes caused by the appearance of new singularities observed with large holes were specifically determined. Isoclinics were computed for the infinite sheet and recorded without error for finite relationships. The most important practical result is represented by the curve of stress increase at the smallest cross section as a function of hole diameter, for which a simple approximate formula is given applicable to case of the hole diameter being less than one half the width of the bar. At the rivet hole there is a uniform stress condition dependent upon the Poisson constant m. The calcution of the isoclinics and of the hill of shear stress for this condition, while disregarding the edge of the bar, proves that the changes related to extreme limiting values of m are negligible and thus indicates that photoelastic methods may be utilized even in these exceptional cases.

AD-608 395 Div. 25, 9
OTS Prices: HC $4.00/MF $1.00

Stevens Inst. of Tech., Hoboken, N. J.
THE EFFECTS OF ELECTRIC FIELDS ON THE FLOW OF LIQUID HELIUM.
Research rept.,
by W. Jim Neidhardt and Jack Fajans. May 62,
146p SIT-P65(5/62)
Contract AF49 638 352
AFOSR 2588

Unclassified report

Descriptors: (*Helium, Cryogenics), (*Liquefied gases, Fluid dynamic properties), Electric fields, Hydrodynamics, Dielectric properties, Films, Boundary layer, Phase studies.

An investigation was made of the effect of electric fields on the flow of liquid helium in a narrow channel superleak whose exit was maintained at a pressure far below the vapor pressure of the liquid. Liquid helium evaporation in the channel and the resulting liquid-gas interface caused an electric pressure gradient. It was found that electric fields of magnitude 3,000,000 volts/cm did not destroy the superfluidity exhibited in the channel. The effect of the applied electric field was to increase flow above and below the lamboa point. Below the lamboa point, both the normal and the superfluid flows were increased by the applied field. At very high applied field the flow attained a limiting value which was a function of temperature.

AD-608 414 Div. 25
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
LOW-TEMPERATURE FAR-INFRARED SPECTRA OF GERMANIUM AND SILICON.
Physical Sciences and Research Papers,
by Peter J. Gielisse, James R. Aronson, and Hugh G. Mclinden. Jun 64, 18p
Proj. 5621
AFCRL 64 491; AFCRL PSRP34

Unclassified report

Descriptors: (*Germanium, Spectra (Infrared)), (*Silicon, Spectra (Infrared)), (*Spectra (Infrared), Cryogenics), Crystals, Band sprectrum, Refractive index, Absorption, Frequency.

New high-resolution low-temperature (7.5K) far-

infrared data on intrinsic germanium and silicon are presented. The findings further substantiate the naturally anticipated similarities in band patterns of the vibrational spectra of diamond type crystals. The low temperature spectra of germanium and silicon show clearly resolved splits in their principal absorption bands analogous to the intriguing doublet in the ca. 2000/cm band in diamond. A possible explanation is indicated. The room temperature far-infrared refractive index of both germanium and silicon and the 7.5K refractive index of germanium have been measured by means of interference fringes. (Author)

AD-608 443 Div. 25, 14
OTS Prices: HC $1.00/MF $0.50

Carborundum Co., Niagara Falls, N. Y.
TOPOTACTICAL REARRANGEMENT IN AlC4B24 AND PREPARATION OF A NEW BORON CARBIDE TYPE STRUCTURE.
Technical rept. no. 4,
by J. Economy, V. I. Matkovich, and R. F. Giese, Jr.
Oct 64, 15p
Contract Nonr4075 00, Proj. NR056 449
Unclassified report

Rept. on Interstitial Compounds of Boron and Transition Metals.
Presented at the American Chemical Society, Chicago, 1964.

Descriptors: (*Borides, Crystal structure), (*Aluminum compounds, Borides), (*Crystal structure, Borides), Single crystals, Phase studies, Boron compounds, Carbides, High-temperature research.

Single crystals of AlC4B24 undergo an irreversible rearrangement at high temperatures to a boron carbide type structure. During the reaction the form of the original single crystal is not altered, which enables tracing of the crystallographic axes during the transition. The rearrangement can be expressed in terms of a change in packing from hexagonal closest to cubic closest packing of icosahedral boron groups. The boron carbide phase contains a variable amount of aluminum over the composition range of B12C2Al25 - B12C2Al.75. This range is interpreted to be part of a homogeneity range between a boron carbide B12C2 and a ternary phase B12C2Al. (Author)

AD-608 444 Div. 25, 14
OTS Prices: HC $1.00/MF $0.50

Carborundum Co., Niagara Falls, N. Y.
STRUCTURE OF YB12 AND ScB12.
Technical rept. no. 5,
by V. I. Matkovich, J. Economy, R. F. Giese, Jr., and R. B. Barrett. Oct 64, 16p
Contract Nonr4075 00, Proj. NR056 449
Unclassified report

Descriptors: (*Borides, Crystal structure), (*Yttrium compounds, Borides), (*Scandium compounds, Borides), (*Crystal structure, Borides), X-ray diffraction analysis, Single crystals, Plasma medium, High-temperature research.

Preparation of single crystals of YB12 and ScB12 was carried out and the structure of both compounds was examined. ScB12 was found to be tetragonal with a - 5.22A and c - 7.35A, space group I4/mmm. YB12 was found to be cubic in agreement with earlier reports. A detailed x-ray structure analysis was carried out to determine whether the form of the B12 grouping was cubo-octahedral or icosahedral. The cubo-octahedral grouping of the boron atoms is confirmed which is in agreement with that proposed by earlier writers based on steric considerations. The only variable parameter in the structure is found to be x - 0.1679, the B-B distance was determined to be 1.78A and Y-B distance is 2.79A. A new method for isolating metastable single crystals using a plasma is described. (Author)

AD-608 445 Div. 25, 8
OTS Prices: HC $4.00/MF $1.00

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
DEVELOPMENT OF A LARGE-VOLUME SUPERCONDUCTING SOLENOID.
Doctoral thesis,
by Lucien J. Donadieu. 16 Oct 64, 131p RLE-427
Contract DA36 039AMCO3200E; Grant DA SIG36 039 61-G14
Unclassified report

Descriptors: (*Superconductors, Solenoids), (*Solenoids, Superconductors), Coils, Superconductivity, Niobium alloys, Molybdenum alloys, Rhenium alloys, Zirconium alloys, Magnetic properties, Electrical properties, Cryogenics, Quenching (Cooling), Heat transfer, Thermal radiation, Feasibility studies, Experimental data.

Problems encountered in the development of large-volume superconducting solenoids have been investigated in the light of the experience induced by the realization of a particular prototype (8.0 inches in diameter, 4 ft long, 20 kilogauss at room temperature). The current-field characteristics of some useful superconducting materials (Nb, Mo-Re, Nb-Zr) have been measured; the results are discussed in terms of recent theories of superconductors. The spurious loss of the resistanceless state of a superconducting solenoid, which is particularly dangerous for large-volume devices, because of the large magnetic energy involved, was thoroughly investigated. Starting from the steady-state mechanisms of the quenching propagation in wire, the equations for current decay, voltage surge, wire-temperature rise, and energy transfer are derived; results of calculations for the prototype solenoid are presented. The design of the prototype solenoid, which can be divided somewhat arbitrarily into the magnetic-field generating system and the cryogenic system, is thoroughly detailed. The most important topics covered are: field calculation for multicoil solenoids (a machine program to calculate the field on- and off-axis is presented); magnetic stresses and magnetic energy; quenching process for multicoil solenoids; steady-state heat transfer caused by residual gas, thermal radiation and conduction (a derivation of the conduction loss with counterflow gas cooling is presented); and transient heat transfer, particularly during cooling down and quenching. Preliminary results are discussed, and suggestions for an improved design are made. (Author)

AD-608 449 Div. 25, 14
OTS Prices: HC $2.00/MF $0.50

Wilkes Coll., Wilkes-Barre, Pa.
PRECISION MEASUREMENT OF INTERNAL FRICTION IN NON-METALLIC MATERIALS.
Final rept.,
by D. P. Detwiler and S. J. Holden. Oct 64, 25p
Contract AF33 616 8050, Proj. 7021, Task 7021 02
ARL 64 160
Unclassified report

Descriptors: (*Quartz, Internal friction), (*Internal friction, Measurement), Crystals, Mechanical properties, Crystal lattice defects, Sodium compounds, Chlorides, Cryogenics, Non-metals.

Internal friction measurements were made on an

outstandingly good quartz crystal. Several internal friction peaks are observed and these are discussed. In addition a previously unreported anomaly is observed in the resonant frequency versus temperature curve for the quartz crystal. These measurements were made over a temperature range of approximately -125C to 300C. The internal friction of sodium chloride was measured at room temperature in a free decay apparatus. (Author)

AD-608 454 Div. 25
OTS Prices: HC $2.00/MF $0.50

Wales Univ., Cardiff.
THEORY OF THE DECAY OF EXCESS CARRIER CONCENTRATIONS IN SEMICONDUCTORS.
Scientific rept. no. 2,
by D. A. Evans and P. T. Landsberg. 1 Jul 64,
46p
Contract AF61 052 664

AFCRL 64 828 Unclassified report

Descriptors: (*Semiconductors, Theory), Electron transitions, Ionization, Recombination reactions, Partial differential equations, Great Britain.

Differential equations are presented for the decay of excess carrier concentrations in semiconductors by Shockley-Ready and Auger processes involving recombination centres. An exact solution is obtained for the interaction of centres with the conduction band only and an approximate solution for the interaction with both bands. For the one-band case three ranges of excess concentration can, in principle, be distinguished in one of which the decay is exponential. For the two-band case there are four ranges, in three of which the decay is exponential. The theory applies also in the presence of a constant electric field. For small departures from equilibrium the results agree with those derived earlier by a different method. (Author)

26. Production and Management

AD-608 055 Div. 26, 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE ROLE OF COST-UTILITY ANALYSIS IN PROGRAM BUDGETING,
by G. H. Fisher. Sep 64, 44p RM-4279-RC
Unclassified report

Descriptors: (*Management planning, Budgets), (*Federal budgets, Decision making), (*Decision making, Federal budgets), Costs, United States government, Management control systems, Defense systems, Irrigation systems, Mathematical models.

The decision-making process in the Federal Government and program budgeting concepts and analytical techniques which might help sharpen intuition and judgment in making major allocative decisions are discussed. The main purpose of the research is to help improve understanding of the principles of program budgeting, to stimulate others to develop these ideas further, and to accelerate the application of program budgeting in governmental activities. The chapter represented by this Memorandum is concerned with the use of cost-utility analysis as an integral part of the total program budgeting process.

AD-608 069 Div. 26, 17, 31
OTS Prices: HC $4.00/MF $0.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
DEVELOPMENT OF A NONDESTRUCTIVE INSPECTION METHOD FOR TITANIUM WELDMENTS.
Final rept.,
by H. H. Spieth and A. D. Warren. 7 Aug 64, 125p
SM-44667
Contract N140 131 75808B
Unclassified report

Descriptors: (*Welds, Titanium alloys), (*Nondestructive testing, Welds), (*Titanium alloys, Welds), Quality control, Neutron activation, Oxygen, Carbon, Vacuum apparatus, Electron beams, Ultrasonics, Temperature, Resistance (Electrical), Welding, Submarine hulls, Radioactivation analysis.

Work accomplished during the program to develop a nondestructive inspection method for titanium weldments is presented. The most successful method developed was neutron activation analysis for oxygen and carbon detection. A vacuum hot extraction method using an electron beam welder successfully differentiated uniformly contaminated screening specimens but was unable to detect single contaminated passes in a two inch weldment. The electron beam spike apparently damaged the weld as well. Temperature coefficient of resistance and ultrasonics inspection methods were eliminated after the screening phase of the program. (Author)

AD-608 072 Div. 26, 14, 17, 30
OTS Prices: HC $2.00/MF $0.50

MRD Div., General American Transportation Corp., Niles, Ill.
DEVELOPMENT ON NONDESTRUCTIVE TESTING METHODS FOR THE EVALUATION OF THIN AND ULTRATHIN SHEET MATERIALS.
Rept. for 30 May 63-1 Jun 64,
by G. Schmitz, A. Wieczorek, and M. Levine. Sep 64, 47p
Contract AF33 657 11228, Proj. 7360, Task 736002
ML TDR64 278
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sheets, Non-destructive testing), (*Non-destructive testing, Sheets), Test methods, Test equipment, Instrumentation, Ultrasonic radiation, Electrostatics, Ceramic coatings, Refractory metals, Mechanical properties, Metals, Ceramic materials, Plastics, Fracture (Mechanics), Honeycomb cores, Sandwich construction.

Activity on the subject program for the first year is described, including a survey of literature, equipment, research efforts, and nondestructive testing needs. As a result of this survey, the second portion of the first year's activity was directed toward the development of thin sheet nondestructive test instrumentation in the field of high frequency eddy current equipment, Lamb wave ultrasonic techniques, and electrostatic testing techniques. The eddy current instrument operates at 5 Mc. with future work being planned for frequencies to 50 Mc. The Lamb wave techniques are directed toward finding material parameter variations and laminations in thin sheet. The electrostatic tests utilized thin nonconductive samples with application to ceramic coated refractories considered. (Author)

AD-608 169 Div. 26, 30
OTS Prices: HC $2.00/MF $0.50

Army Missile Command, Redstone Arsenal, Ala.
ADOPE. AUTOMATIC DECISIONS OPTIMIZING PREDICTED ESTIMATES.
12 Jun 63, 49p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Management planning, Data processing systems), Management engineering, Industrial production, Costs, Labor, Wages, Automatic, Models (Simulations), Computers, Time studies, Networks, Equations, Probability, Statistical analysis.

ADOPE is a means of forecasting production: Units, Cost, Direct Manhours, Wage Rates, and Overhead Rates. More precisely, it is a computer application employing mathematical methods of calculating various units, Cost, and DMH relationships and behavior trends, automatically selecting the network that will produce the best calculated forecast based upon historical data.

AD-608 231 Div. 26, 17
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
THERMOMECHANICAL TREATMENTS OF THE 18% Ni MARAGING STEELS,
by Eric B. Kula and Charles F. Hickey, Jr.
Sep 64, 23p
Proj. 1A024401A1102
AMRA TR64 27
Unclassified report

Descriptors: (*Maraging steels, Cold working), Heat treatment, Nickel alloys, Aging (Materials), Austenite, Martensite, Hardening, Tensile properties, Effectiveness.

Thermomechanical treatments applied to the maraging steels include (a) cold working in the austenitic condition at 650F, followed by transformation to martensite and aging, (b) cold working in the martensitic condition and aging, and (c) cold working in the aged condition with and without subsequent re-aging. The strength increases in these steels are very small compared to the increases observed in conventional carbon and alloy steels. The changes that are observed are compatible with the strengthening mechanisms operative during thermomechanical treatment of conventional steels, however. Differences are caused by the absence of a carbide precipitate and the low work-hardening rate in both the solution-treated and the aged conditions. (Author)

AD-608 238 Div. 26, 28
OTS Prices: HC $3.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
ORGANIZATIONAL LEARNING: OBSERVATIONS TOWARD A THEORY,
by Vincent E. Cangelosi and William R. Dill.
Jul 64, 54p ONR-RM-125
Contract Nonr27T024
Unclassified report

Descriptors: (*Learning, Group dynamics), (*Management engineering, Decision making), Simulation, Performance (Human), Behavior, Theory, Management planning, Industrial relations.

The objective of this research was an exploratory one. Close observations of a team faced with a complex and prolonged task in a management simulation exercise resulted in comprehensive discussions of how organizations learn. Each of these discussions lacked coverage for some of the things that had been observed in the game; however, a synthesis was proposed which makes learning in organization a product of different kinds of stress. It presumes that organizational learning is sporadic and step-wise rather than continuous and gradual and that learning what preferences and goals are goes hand-in-hand with learning how to achieve them. It postulates separate mechanisms to control adaptation of the organization as a total system. Links are also proposed to show how the interactions between subsystem and total-system adaptation determine the overall course of organizational learning and development. (Author)

AD-608 246 Div. 26, 28
OTS Prices: HC $2.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
THE ATTAINMENT OF ORGANIZATION GOALS THROUGH APPROPRIATE SELECTION OF SUB-UNIT GOALS,
by A. Charnes and A. C. Stedry. 5 Aug 64, 34p
ONR-RM-133
Contract Nonr1228 10; Grant NsG235 62, Proj. NR047 021
Unclassified report

Prepared in cooperation with Northwestern Univ., Evanston, Ill.

Descriptors: (*Management engineering, Decision making), (*Industrial relations, Management engineering), Behavior, Group dynamics, Management planning, management control systems, Optimization, Probability, Equations, Mathematical models, Performance (Human), Theory.

This paper is concerned with two approaches to organizational behavior, both of which possess a fairly high degree of internal consistency. The disparities which exist between these two bodies of thought, however, appear to exceed the level of a multi-faceted approach to a problem that might be considered to have beneficial results. While these disparities cover the entire area of organizational research, the emphasis is on the problems of organizational control - i.e., the coordination of the activities of various subunits in the organization in order to attain the aims of the organization as a whole.

AD-608 290 Div. 26, 12, 17
OTS Prices: HC $2.00/MF $0.50

Norair Div., Northrop Corp., Hawthorne, Calif.
DEVELOPMENT OF MANUFACTURING CAPABILITY FOR PRODUCING HIGH PERFORMANCE ALUMINUM AND MAGNESIUM ALLOY CASTINGS.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 64,
by A. J. Iler. Nov 64, 48p NOR-64-278
Contract AF33 615 1341, Proj. 8 119
Unclassified report

Descriptors: (*Aluminum alloys, Castings), (*Magnesium alloys, Castings), (*Castings, Spacecraft), (*Casting alloys, Mechanical properties), Zinc alloys, Silver alloys, Zirconium alloys, Casting, Molding, Tensile properties, Corrosion, Stresses, Heat treatment, Quenching (Cooling), Manufacturing methods.

This report describes development work on the Mg-Zn-Ag-Zr alloys; further work on aluminum alloys ST60 and M710; development of a modified aluminum alloy 195; Phase II and Phase III configuration pattern; the first founding experinece in the Mg-Zn-Ag-Zr alloy, and a general summary of the program development in terms of significance to the program objective.

AD-608 314 Div. 26, 17
OTS Prices: HC $3.00/MF $0.75

Western Gear Corp., Lynwood, Calif.
HIGH ENERGY RATE FORGING DEVELOPMENT.
Interim technical progress rept. no. 1, phase 4, Jan-Jun 64,
by F. L. Parkinson. Jul 64, 62p WGC-647-226
Contract AF33 600 42523
AMC TR7 866 VII
Unclassified report

Prepared in cooperation with Precision Forge Company (Forging Subcontractor).

Descriptors: (*Explosive forming, Metals), (*Forging, Feasibility studies), (*Steel, Forging), Material forming, Nickel alloys, Niobium alloys, Molybdenum alloys, Carbon alloys, Silicon alloys, Tolerances (Mechanics), Tensile properties, Metallography, Gears.

High energy rate dynapak forging of a thin webbed gear blank configuration was studied using Vascojet 1000 and 4340 steel alloys. With this given configuration laps or cracks at the web-rim intersection are markedly affected by final web thickness and percent upset per blow. Sound parts were produced with web thickness of about .180 inches. Description of the forging processes along with all forging parameters are given and the results examined in terms of dimensional reproducibility hardness surveys, tensile properties and metallographic analysis. (Author)

Division 26 - PRODUCTION AND MANAGEMENT

AD-608 338 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
A COMPARATIVE ANALYSIS OF SOME ALTERNATIVES TO THE SHEWHART CONTROL-CHART TECHNIQUE.
Final rept. for 17 Sep 54-31 Aug 64,
by M. H. DeGroot and M. M. Rao. 1 Oct 64, 10p
Contract DA36 061ORD447, Projs. 5B99 01 004,
TB2 0001 1280
AROD 1280 13

Unclassified report

Descriptors: (*Quality control, Statistical distributions), (*Statistical analysis, Control), (*Control, Graphics), Analysis of variance.

This report summarizes research dealing with alternatives to the Shewhart control chart and other technical problems arising from the original studies. Work reported in eleven technical reports issued previously is summarized. The problems studied since the issuance of TR-11 are the following: 1) Estimating a multi-dimensional parameter; 2) Finding maximally correlated linear combinations between a set of measurements made on one individual and a set of similar measurements made on a closely related individual; 3) Finding conditions for the existence and explicit construction of estimators with minimum risk at a given point among all unbiased estimators of a parametric function. A related problem in Bayes estimation is also considered.

AD-608 342 Div. 26, 18, 30
OTS Prices: HC $3.00/MF $0.75

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
THE USE OF REAL TIME COMPUTERS FOR INVENTORY CONTROL.
Interim technical rept.,
by Donald D. Sharp, Jr. Nov 64, 78p MSEE-64-21
Contract Nonr551 40

Unclassified report

Descriptors: (*Inventory control, Digital computers), (*Data processing systems, Real time), (*Digital computers, Inventory control), Automata, Management engineering, Information retrieval, Systems engineering, Logistics, Industries, Feasibility studies.

A real-time system provides immediate access to information stored in the computer by operating personnel throughout the organization. The purpose of this thesis is to analyze existing and proposed real-time inventory control systems in order to determine the advantages and disadvantages of this new management technique. Although real-time inventory control systems are still in tehe developmental stage, an examination of the implications of these real-time systems should provide an insight into the possibilities for wide spread use of real-time systems for inventory control and for other business applications.

AD-608 461 Div. 26
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
UNIVERSAL ASSEMBLY OF PREFABRICATED MACHINE PARTS FOR PNEUMATIC GUIDANCE CONTROL,
by H. Toepfer, D. Schrepel, and A. Schwarz.
28 Oct 64, 28p
FTD TT64 723; TT 65 60126

Unclassified report

Unedited rough draft trans. of Messen-Steuern-Regeln (East Germany) 1963, v. 7, no. 2, p. 63-72.

Descriptors: (*Pneumatic systems, Control systems), Manufacturing methods, Pneumatic servomechanisms, Positioning devices (Machinery), East Germany. Machine tools, Adaptive control systems, Feedback, Circuits, Wiring diagrams, Mechanical drawings.

Developments of emission elements of guidance control in the field of pneumatics are discussed. The advantage of emission elements consists of the fact that they do not have any moving parts and thus posses great longevity and extensive switch velocity. In addition, temperature independence can be achieved by selecting suitable materials. An assembly of prefabricated parts which are developed by taking into consideration these points and which close the gap between the disadvantages analogous elements and the emitter which currently are not yet suitale for industrial application is presented.

27. Propulsion Systems

AD-608 003 Div. 27, 12
OTS Prices: HC $1.00/MF $0.50

Electronic Research Lab., Ramo-Wooldridge Corp., Los Angeles, Calif.
A SUMMARY OF THE PROPERTIES OF SPACE-CHARGE LIMITED BEAMS FOR THRUST APPLICATIONS,
by D. B. Langmuir and H. Shelton. 17 Oct 56, 7p
ERL-102

Unclassified report

Descriptors: (*Ion beams, Thrust), (*Rocket propulsion, Ion beams), (*Ion engines, Rocket propulsion), Space charges.

Pertinent space charge equations and numerical values are presented for application of electron beams to achieve high specific impulses for rocket propulsion. A chart is derived for space charge limited mass flow where the ratio of molecular weight to number of electronic charges is plotted against accelerating voltage at 1-cm fixed spacing. The Pierce gun (J. R. Pierce 'Theory and Design of Electron Beams,' Van Nostrand, 1949, Chapter 10) is cited as possible of modification for application of the calculations. Effective current-carrying area would be 2 to 5% of total surface. With 30,000v the area would be 2 to 5 sq m/kg of thrust. Rocket electrical neutrality might be attained by having half the emitted particles postively charged and half negatively.

AD-608 091 Div. 27, 9
OTS Prices: HC $3.00/MF $0.75

Naval Ordnance Test Station, China Lake, Calif.
FLOW OF GAS IN TAPERED CHANNEL WITH MASS ADDITION,
by George L. Dehority, Harold H. Bradley, Jr., and E. W. Price. Sep 64, 62p
NOTS TP3626; NAVWEPS 8606

Unclassified report

Descriptors: (*Gas flow, Adiabatic gas flow), (*Rocket propellant grains, Combustion), Propulsion, Design, Taper, Numerical analysis, Fluid mechanics, Differential geometry, Graphics, Interior ballistics, Rocket motors (Solid propellant).

An analysis was made of adiabatic, steady-state gas flow with combined area change and mass addition. A pseudo-one-dimensional model was assumed. A more detailed flow analysis was made for the class of single port rocket grains in which the differential rate of change of channel port area with respect to burning surface area is constant throughout the length of the grain. The resulting system of equations was coded for IBM 7090 computer. The change of channel geometry with time was not considered in the analysis. The relationships between various dimensionless groups involving flow variables, channel geometry and propellant properties are presented in the form of equations and graphs. The relationships reduce to those for constant area flow when a parameter lambda is equal to zero. This parameter is positive when the channel area increases with length and is negative when the channel area decreases. The limiting flow for converging channels (lambda equals minus infinity) represents isentropic flow. Numerical examples which illustrate the effect of channel taper on rocket grain design are appended. (Author)

AD-608 350 Div. 27, 1, 26
OTS Prices: HC $3.00/MF $0.75

George Washington Univ., Washington, D. C. School of Engineering and Applied Science.
ANALYZING SELECTED UNITED STATES AIR FORCE DATA SYSTEMS AND DETERMINING SUITABILITY OF DATA FOR RELIABILITY MEASUREMENTS OF AIRCRAFT ENGINES.
Master's thesis,
by Thomas Bennett McHugh. Feb 64, 68p

Unclassified report

Descriptors: (*Aircraft engines, Reliability), Performance (Engineering), Probability, Maintenance, Systems engineering, Air Force equipment.

The paper has as its objectives (1) the determination of whether present Air Force data systems provide a suitable basis for computing aircraft engine reliability, and (2) the determination of necessary system changes.

AD-608 389 Div. 27, 10, 25
OTS Prices: HC $2.00/MF $0.50

Rocketdyne, Canoga Park, Calif.
A STUDY OF HEAT TRANSFER CHARACTERISTICS OF HOT GAS IGNITION.
Quarterly progress rept. no. 2, for period ending 31 Oct 64,
by L. W. Carlson and J. D. Seader. 6 Nov 64, 50p Rocketdyne-RM-1094/362
Contract AF04 611 9884

Unclassified report

Descriptors: (*Rocket igniters, Heat transfer), (*Heat transfer, Rocket igniters), Gases, Heaters, Gas flow, Valves, Power supplies, Nozzles, Thermodynamics, Mathematical models, Programming (Computers), Rocket motors (Solid propellant), Ignition.

Major effort was directed towards the completion of the experimental apparatus and the initiation of experimental tests. Hot gas heater fabrication and assembly was completed. The two-inch diameter steady-state test section was fabricated, instrumented and installed. The operation of the system was successfully checked out during both cold and hot gas flow tests. Some minor equipment modifications were required to improve initial response of the system. A computer program was devised to process and graph the experimental data. This computer program is nearing completion. A total of ten runs were made under hot gas flow conditions covering a range of m and L/D. The data have not yet been processed, but preliminary hand calculations for one run gave very encouraging results. Analytical studies were conducted to develop a suitable gas dynamic and heat transfer model to aid in data correlation. The nature of the initial jet expansion was examined in detail and available expressions for the fully developed flow heat transfer coefficient were compared. Author)

AD-608 452 Div. 27
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RESULTS OF STUDYING THE FLOW THROUGH GRIDS OF TURBINE BLADES OF GREATER DEGREE OF REACTIVITY AT VELOCITIES EXCEEDING THE SPEED OF SOUND,
by J. Smigielski, A. Zabicki, and J. Dudzisz.
16 Nov 64, 22p
FTD TT64 389; TT 65 60121

Unclassified report

Unedited rough draft rans. of Polska Akademia Nauk.

Instytut Maszyn Przeplywowych. Prace, 1963, no. 13, p. 19-36.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gas turbine blades, Supersonic characteristics), (*Supersonic characteristics, Gas turbine blades), Pressure, Fluid flow, Flow visualization, Supersonic flow, Fluid dynamic properties.

This report describes an experimental investigation of profile grids intended for a gas turbine. (Author)

AD-608 455 Div. 27, 1
OTS Prices: HC $4.00/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
JOINT OSCILLATIONS IN GAS TURBINE ENGINES, by A. F. Gurov. 5 Nov 64, 146p
FTD MT64 68; TT 65 60123 Unclassified report

Sovmestnye Kolebaniya v Gazoturbinnykh Dvigatelyakh, edited machine trans. of Aviatsionnyi Institut, Moscow. Trudy (USSR) 1962, v. 144, 142p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aircraft engines, Oscillation), (*Gas turbines, Oscillation), Gas turbine rotors, Suspension devices, Fuselages, Wings, Airframes, Shafts, Resonance, Dynamics, USSR.

Consideration is given to questions of the calculation of critical rpm and resonance regimes of engines, the rigidity of the body of which is commensurable with, or less than, the rigidity of the rotor, which is frequently encountered in practice of aircraft engine design. Considered are joint oscillations of the revolving shaft of an engine on pliant supports with a pliant body. Solution is carried out by the method of dynamic compliance. Considered is an example of design of a gas-turbine engine. (Author)

28. Psychology and Human Engineering

AD-608 122 Div. 28
OTS Prices: HC $2.00/MF $0.50

Colorado Univ., Boulder.
CONCEPT FORMATION AND ATTAINMENT AS A FUNCTION OF PERSONALITY ORGANIZATION.
Technical rept. no. 10,
by Catherine M. Felknor and O. J. Harvey. 1963, 34p
Contract Nonr1147 07

Unclassified report

Descriptors: (*Personality, Psychometrics), (*Psychometrics, Personality), (*Projective techniques, Psychometrics), Performance tests.

This study investigated differences that occured in concept formation and concept attainment between groups of subjects which were classified into the four systems of conceptual functioning proposed by Harvey et al. (1961). There were ten subjects in each system. The concept formation task involved the sorting of instances into meaningful classes or categories. The concept attainment task (Bruner et al., 1956) involved discovering the defining attributes of the instances included in a category specified by the experimenter. The concept formation task was scored for (1) completion, (2) repetition, (3) novelty of concepts, and (4) appropriateness of concepts. The concept attainment task was scored for (1) time required to solve each problem, (2) number of cards tested, (3) total number of steps taken in solving each problem, (4) ratio of guesses to total number of steps, (5) effect of the shift from the ordered stimulus display, (6) orientation toward the problems, (7) informational redundancy in the selection of instances for testing, (8) basis for guesses, and (9) the use of inappropriate concepts. Thus each task was scored on both qualitative and quantitative measures.

AD-608 215 Div. 28
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
THE EMERGING ROLE OF ENGINEERING PSYCHOLOGY.
Final rept.,
by Julien M. Christensen. Sep 64, 24p
Proj. 7184
AMRL TR64 88

Unclassified report

Descriptors: (*Human engineering, Engineering), Industrial psychology, Military psychology, History, Education.

The history of engineering psychology and its relationship to engineering are briefly traced. The emergence of engineering psychology from the knobs and dials stage to a full-fledged participating profession in systems planning and development is described. Some of the problems confronting engineering psychology are described. the chief of which is the development of suitable educational programs in a sufficient number of universities to supply the current and anticipated demand for workers in this area. (Author)

AD-608 219 Div. 28, 18, 23, 24
OTS Prices: HC $4.00/MF $0.75

Applied Psychology Corp., Arlington, Va.
PERFORMANCE OF PHOTOGRAPHIC INTERPRETERS AS A FUNCTION OF TIME AND IMAGE CHARACTERISTICS.
Final rept.
Sep 64, 104p
Contract AF30 602 2717, Proj. 6244, Task 624402
RADC TDR63 313

Unclassified report

Descriptors: (*Photointerpreters, Performance (Human)), (*Photointerpretation, Performance tests), Applied psychology, Time, Data, Identification, Military intelligence.

Effects on photo interpreter performance of different viewing times, work-rest cycles, and image quality and content were studied. Results indicate that collection and processing agencies should avoid inadequate levels of scale, resolution, or contrast even at the expense of sacrificing high levels of any of these variables. Viewing times of 4 seconds for scanning and 60 seconds for identifying features seem adequate. In these times, the interpreter has extracted about 90% of the total information which he is going to extract. Over relatively short periods of time (four hours), varying work-rest cycles do not significantly affect accuracy or completeness of interpreters. (Author)

AD-608 226 Div. 28
OTS Prices: HC $2.00/MF $0.50

Institute for Research in Social Science, Univ. of North Carolina, Chapel Hill.
ANNUAL TECHNICAL REPORT FOR THE PERIOD 1 NOVEMBER 1963-31 OCTOBER 1964. 1. STUDIES USING THE THIBAUT AND KELLEY FRAMEWORK. 2. STUDIES APPLYING PRINCIPLES OF SCALE FORMATION TO SOCIAL PSYCHOLOGICAL PROBLEMS. 3. OTHER STUDIES .
31 Oct 64, 50p
Contract Nonr855 04

Unclassified report

Descriptors: (*Social psychology, Reports), (*Psychometrics, Social psychology), Group dynamics, Behavior, Personality, Perception (Psychology), Motivation, Attitudes, Learning, Reaction (Psychology), Adjustment (Psychology), Anxiety, Abnormal psychology, Children, Males, Females.

The research activities of the Organization Research Group of the Institute for Research in Social Science at the University of North Carolina at Chapel Hill are summarized. The nature and present status or results of particular studies, including both those in which the members of the Organization Research Group played a leading participatory role and those in which they acted in more of a consultative capacity, are described. Studies using the constructs of the Thibaut and Kelley system are listed, and are followed by studies related to the application of principles of scale formation to social psychological problems. The report ends with studies of situational and individual factors in experimentation.

AD-608 269 Div. 28, 32
OTS Prices: HC $3.00/MF $0.75

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
RESEARCH CAPABILITY OF THE USAF POPULATION. PHASE I. THE OUTER BOUNDARIES OF GRASPING-REACH ENVELOPES FOR THE SHIRT-SLEEVED, SEATED OPERATOR.
Final rept. for Jan 60-Jan 62,

by Kenneth W. Kennedy. Sep 64, 97p
Proj. 7184, Task 718408
AMRL TDR64 59

Unclassified report

Prepared in cooperation with Antioch Coll., Yellow Springs, Ohio, Contract AF33 616 6792.

Descriptors: (*Human engineering, Aircraft equipment), (*Air force personnel, Anthropometry), Design, Cockpits, Pilots, Extremeties, Anatomy, Body, Arms, Flight, Aircraft seats, Statistical data.

The outer boundaries of the Minimum, 5th-, 50th-, and 95th-percentile grasping-reach envelopes of seated, shirt-sleeved operators are described. The two most important are the Minimum and 5th-percentile envelopes. These envelopes have been calculated to permit 99+ percent or 95 percent of the Air Force population, respectively, to reach any point at their boundaries. The report contains a critical resume of previous investigations of arm reach, and a description of the AMRL Grasping-Reach Measuring Device. The data-gathering and statistical procedures are included, and applications of the reach envelopes are discussed. Horizontal contours representing the outer boundary of the Minimum, 5th-, 50th-, and 95th-percentile grasping-reach envelopes are presented for each 5-inch level beginning at 5 inches below SRP (Seat Reference Point) and extending to 50 inches above SRP. The Minimum envelop extends from 2.5 inches below SRP to 48 inches above; the 5th-percentile envelope from 4 inches below SRP to 48.75 inches above. Horizontal distances from SRP to the boundary of each envelope are given at 15 degree intervals. (Author)

AD-608 381 Div. 28, 18
OTS Prices: HC $2.00/MF $0.50

Oklahoma Univ. Research Inst., Norman.
ADAPTIVE PROCESSES USED IN EFFECTS MODELING.
Technical rept.,
by R. A. Terry, F. J. Kern, J. A. Nickel, and J. D. Palmer. 29 Apr 64, 32p OURI-TR-1419-3
Contract AF08 635 3693

Unclassified report

Presented at the Symposium on the Psychological Effects of Non-Nuclear Weapons (1st), Eglin AFB, Flordia.

Descriptors: (*Warfare, Psychology), (*Mathematical models, Reaction (Psychology)), (*Sociology, Reaction (Psychology)), Adjustment (Psychology), Weapon systems, Programming (Computers), Systems engineering, Bombing.

The purpose of the present study was to develop a computer model which would simulate a social system in such a manner as to indicate probable psychological effects of conventional weapons employed against it. In order to provide a stable basis for the modeling procedure, a data-derived approach was decided upon for initial investigations. For the social system modeling problem the experimenter was considered to be able to manipulate inputs from a distance only. He endeavors to manipulate these inputs in such a manner as to effect a decay in system performance. This decay will be measured according to criteria provided by the experimenter himself and will be measured by the experimenter himself. The experimenter may also measure the suppressed outputs of the system by means of probes (spies) which communicate with the experimenter.

AD-608 402 Div. 28, 16
OTS Prices: HC $2.00/MF $0.50

Duke Univ., Durham, N. C. School of Medicine.
PSYCHOPHYSIOLOGICAL MECHANISMS OF STRESS RESPONSIVITY.
Annual rept.
by Sanford I. Cohen and Albert J. Silverman. Jun 61, 46p
Contract AF49 638 354
AFOSR 1515

Unclassified report

Descriptors: (*Stress (Physiology), Reaction (Psychology)), (*Psychophysiology, Stress (Psychology)), Central nervous system, Sensory perception, Anxiety, Sensory deprivation, Confinement (Psychology), Personality, Psychochemical agents, Lysergic acids, Drugs, Endocrine glands, Perception (Psychology), Thresholds (Physiology), Tolerances (Physiology), Electroencephalography, Pain, Projective techniques, Galvanic skin response, Psychometrics.

Research is summarized on work in the following four areas: (1) central nervous system, peripheral physiological endocrinological and psychological responses of body and field oriented subjects to experimental situations characterized by uncertainty, social and sensory isolation and limitation of movement; (2) analysis of personality, physiological and central nervous system correlates of body and field perceptual modes and the exploration of other individual determinants of the response to low sensory input experiments; (3) a study of the influence of drugs acting on central nervous system in body and field oriented subjects in low sensory input experiments; and (4) an exploratory study of the influence of a psychochemical (LSD) on response to two hour low sensory input experimental conditions.

AD-608 406 Div. 28, 16, 32
OTS Prices: HC $2.00/MF $0.50

Duke Univ., Durham, N. C.
BASES AND CONSEQUENCES OF SYSTEMS OF COMMUNICATION.
Annual status rept. for 1 Oct 63-30 Sep 64,
by Kurt W. Back. 30 Sep 64, 40p
Contract Nonr1181 1', Proj. NR177 470

Unclassified report

Descriptors: (*Social communication, Psychophysiology), (*Psychophysiology, Social communication), Stress (Physiology), Social psychology, Group dynamics, Motivation, Personaltiy, Adaptation (Physiology), Reaction (Psychology), Stress (Psychology), Fatty acids, Metabolism, Obesity, Appetite, Nervous system, Atherosclerosis, Leadership, Anxiety, Performance tests, Sociometrics, Psychometrics.

The areas of research are divided into the following categories: (A) Socio-Physiology Studies: These studies are designed to determine the relationship between conformity, physiological arousal, and such factors as structure and importance of group, acceptance or rejection by group, Importance of task, degree of motivation and justification for commitment, individual's physiological make-up, etc. The plasma free fatty acid (FFA) level is used as an indicator of the degree of stress which subjects experience during the experimental manipulations; (B) Communication in a Natural Setting: These studies can be divided into two groups--(1) Empathy and Group Structure Studies which are designed to determine the relationship between group structure and communication processes and (2) Methodological Studies in Communication, where the main interest is that of studying different techniques of measuring verbal communication as it takes place in a natural, non-laboratory, setting; and (C) Methods of Social Research: These studies differ in design from the methodological studies of (B) in the sense that they are designed to determine and measure any factor, connected with communication processes, that may cause inconsistency or bias in the collection and interpretation of data.

AD-608 407 Div. 28
OTS Prices: HC $3.00/MF $0.75

New York Univ., N. Y.
CRITERIA AND TRANSFER OF TRAINING.
Technical rept. no. 2,
by Joseph Weitz. Nov 64, 64p
Contract Nonr285 51
Unclassified report

Rept. on the Investigation of Criterional Variables and their Relation to Proficiency Measures.
Prepared in cooperation with the Office of Naval Research.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Transfer of training, Psychometrics), (*Learning, Transfer of Training), Performance tests, Personality, Anxiety, Aptitude tests, Motivation, Performance (Human), Correlation techniques.

It was hypothesized that task approach might be the more salient feature of transfer of training early in an easy task, whereas with a more difficult task, the task content is a greater determiner of the early course of the learning in the transfer situation. Here the effectiveness of the task approach does not become apparent until somewhat later. In order to investigate these hypotheses further, it was thought advisable to study a task where the content remained relatively constant but where there was the possibility of using several different approaches to performing the task.

AD-608 420 Div. 28
OTS Prices: HC $2.00/MF $0.50

Educational Testing Service, Princeton, N. J.
PSYCHOLOGICAL ADVANTAGES IN GAMBLING.
Technical rept. and research bulletin,
by Albert E. Myers. Aug 64, 34p RB-64-43
Contract Nonr2959 00
Unclassified report

Descriptors: (*Group dynamics, Performance (Human)), (*Decision making, Game theory), (*Social psychology, Motivation), Psychometrics, Behavior, Attitudes, Perception (Psychology), Recall, Probability, Sociometrics.

Sixteen pairs of Ss participated in a gambling experiment using shuffleboard bowling machines. Each S in a pair was given two dollars to use in betting with the other player during the 10-game session. Independent variables included the mean level of performance (high vs. low, as determined by the S's ability) and the variability of performance (high vs. low, as manipulated by E). The data indicated that the high-mean players enjoyed a psychological advantage; additional findings concerned with factors involved with the making of a bet and the effect of achievement motivation on gambling behavior are discussed. (Author)

AD-608 424 Div. 28
OTS Prices: HC $6.00/MF $1.00

Washington Univ., Seattle.
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART I. BACKGROUND FOR PSYCHOLOGICAL MEASUREMENT,
by Paul Horst. Oct 64, 189p
Contract Nonr477 33, Grant PHS MH00743 08
Unclassified report

Descriptors: (*Psychology, Measurement), (*Psychometrics, Test construction (Psychology)), (*Test construction (Psychology), Psychometrics), Abnormal psychology, Adjustment (Psychology), Behavior, Group dynamics, Industrial psychology, Intelligence tests, Mathematical prediction, Mental disorders, Military psychology, Personality, Projection techniques, Psychiatry, Psychophysiology, Social psychology, Verbal behavior, Factor analysis, Statistical analysis, Education, Criminology, Diagnosis, Equations, Correlation techniques.

A report is presented on psychological measurement, serving as an introduction to a more ambitious program for synthesizing and integrating the theory and methodology of psychological measurement and scaling. It has been recognized for some years that psychological measurement or psychometrics is concerned primarily with the entity mode of a two mode data matrix, while psychological scaling has been concerned with the attribute mode. Obviously, the two are inextricably interrelated, as the more sophisticated developments in factor analysis have made abundantly explicit. In spite of this interdependence an opaque, or at best a translucent, curtain continues to hang between psychometric and scaling activities. It is hoped that this series of reports may be followed by full scale progrms to integrate the two fields of investigation, and that the recent ingenious and major developments of Professor Ledyard Tucker in multimode factor analysis may lead to a further integration of psychometric and scaling theory with learning theory and developmental psychology. Obviously, these latter involve the occasion mode of a three mode data matrix.

AD-608 425 Div. 28
OTS Prices: HC $3.00/MF $0.75

Washington Univ., Seattle.
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART II. MULTIDIMENSIONALITY AND PSYCHOLOGICAL MEASUREMENT,
by Paul Horst. Oct 64, 85p
Contract Nonr477 33, Grant PHS MH00743 08
Unclassified report

Descriptors: (*Psychology, Measurement), (*Psychometrics, Test construction (Psychology)), (*Test construction (Psychology), Psychometrics), Factor analysis, Behavior, Reaction (Psychology), Perception (Psychology), Psychophysiology, Personality, Statistical analysis, Analysis of variance, Matrix algebra, Equations, Correlation techniques.

The importance of the concept of multiple variables is emphasized in a discussion of the generality of multiple variables and their statistical presentation. Two special kinds of multiple variables, known as patterns or profiles and ipsative variables, are considered.

AD-608 435 Div. 28
OTS Prices: HC $4.00/MF $0.75

Princeton Univ., N. J.
COGNITIVE AND MOTIVATIONAL CHARACTERISTICS ASSOCIATED WITH CONCRETE AND ABSTRACT LEVELS OF CONCEPTUAL COMPLEXITY.
Rept. no. 15,
by Nathan C. Claunch. May 64, 104p
Contract Nonr1858 12, Grant PHS M5301,
Proj. NR171 055
Unclassified report

Descriptors: (*Perception (Psychology), Personality), (*Personality, Perception (Psychology)), (*Psychometrics, Personality), Performance (Human), Motivation, Memory, Behavior, Attitudes, Reaction

(Psychology), Performance tests, Learning, Projective techniques, Verbal behavior, Intelligence tests, Attention, Children.

The purpose of this study included: (1) an investigation of the extent to which 'conceptual complexity' contributed to performance on the conceptually simple task of answering objective quizzes requiring only the use of a single, fixed conceptual rule (reduction of facts from memory) and to performance on the conceptually complex task of writing examination answers requiring the use of alternative, flexible conceptual rules in the generation of contrasts, comparisons, and integrations of different theoretical points of view; (2) the delineation of specific quantifiable differences in the way that conceptually simple (concrete) and conceptually complex (abstract) subjects generated contrasts and integrations of two theories in their answers to a prototypic examination question; and (3) the exploration of differences in general attitudes and beliefs about the motivation of behavior which constitute important differences between concrete and abstract ways of perceiving and relating to the environment. As expected, an abstract group of subjects was significantly superior to a concrete group in examination performance but not in quiz performance.

AD-608 436 Div. 28
OTS Prices: HC $3.00/MF $0.75

North Carolina Univ., Chapel Hill.
AN ANALYSIS OF RISK TAKING IN TERMS OF POWER AND COMPARISON LEVEL,
by Peter Gumpert and Nicholas Bateson. 1963, 49p
Contract Nonr 855 04

Unclassified report

Descriptors: (*Game theory, Decision making), (*Decision making, Game theory), Probability, Optimization, Decision theory, Parapsychology, Performance (Human), Power, Behavior, Social psychology.

An attempt was made in this paper to account for a person's showing a consistent preference between two gambles that differ in variance (i. e., in degree of riskiness) but have the same expected value (where expected value is defined as the sum of all the possible payoffs from the gamble, each one multiplied by its objective probability of occurrence). Researchers in decision theory, starting from the assumption that the person must be maximizing utility, have advanced two major explanations for such a preference.

29. Quartermaster Equipment and Supplies

AD-608 410 Div. 29, 2
OTS Prices: HC $0.50/MF $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
ORGANO-SILICONE SURFACTANTS IN ALKALINE CLEANERS.
Final rept.,
by A. Mankowich. 2 Oct 64, 17p
Proj. 1H024401A110 05
CCL 169

Unclassified report

Descriptors: (*Cleaning compounds, Silicone compounds), (*Silicone compounds, Surface-active substances), (*Surface-active substances, Silicone compounds), Surface tensions, Alkaline earth compounds, Tests, Mixtures, Mineral oils, Asphalt, Penetration, Organic compounds.

Organo-silicone surfactants impart very high surface tension depressing characteristics, but in themselves are not good cleaners. When used with other surfactants such as sodium lauryl sulphate or sodium dodecyl benzene sulphonate, a cleaner can be developed equal to formulas described in Federal Specification P-C-436. Present costs would not permit general use of the organo silicone surfactants for this purpose. (Author)

30. Research and Research Equipment

AD-607 997 Div. 30, 25
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
A MEASUREMENT OF THE ELECTRICAL CONDUCTIVITY OF IONIZED GASES.
Rept. for 1 Jan-Aug 60,
by W. R. Grabowsky and H. E. Wohlwill. 31 Dec 60, 29p STL/TR-60-0000-19414

Unclassified report

Descriptors: (*Test methods, Plasma jets), (*Plasma jets, Electrical conductance), (*Gases, Electrical conductance), Transients, Coupling circuits, Graphite, Sodium compounds, Chlorides, Alternating current, Resonance, Exhaust gases, Air, Exhaust nozzles, Ionization, Magnetohydrodynamics.

Two methods were used in attempts to measure the electrical conductivity of various substances, in particular that of a plasma jet. Transients flowing in a system of coupled circuits were subtracted in such a way that the difference signal is due only to the presence of the conducting material. The amplitude and time decay of the signal are calculable functions of the conductivity. This method worked well on graphite, but was too insensitive for aqueous salt (NaCl) solutions. Therefore, it cannot easily be applied to the case of an air arc jet exhaust. The steady-state AC measurement technique was tried next. Resonance properties of a coil coupled to the conducting material were measured and compared to the corresponding properties of the same coil in the absence of the conducting substance. This method was used on salt water in the frequency range of 1-10 mc. It was found to be sufficiently sensitive that the accuracy of the conductivity measurement was expected to be about 10%. Two problems were encountered, however, that were not solved.

AD-607 998 Div. 30
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
PRESSURE VESSEL DESIGN CRITERIA.
Semiannual rept. for 1 Jul-31 Dec 59,
by D. P. Fitzgibbon and John Goodman. 31 Dec 59, 27p STL/TR-59-0000-09955
Contract AF04 647 309
AFBMD TR60 53

Unclassified report

Descriptors: (*Pressure vessels, Design), Tensile properties, Stresses, Loading (Mechanics), Strain (Mechanics), Guided missiles, Materials, Tests, Production, Steel.

The work being performed in the program is intended to provide experimental data to assist in establishing criteria for material selection, design, and fabrication of highly efficient pressure vessels. Tests of AISI 4340 steel were conducted in various biaxial stress fields at seven strength levels, along with wide-bend and uniaxial tensile tests. Ultimate biaxial stresses in high-strength steels exceed the ultimate uniaxial tensile strength by significant amounts depending on the biaxial stress ratio, the pressure vessel shape, and the character of the uniaxial stress-strain diagram. (Author)

AD-608 005 Div. 30,2,8
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
THE MEASUREMENT OF FLUCTUATIONS IN THE APPARENT POSITION OF RADIO STARS,
by Donald J. Farmer. 15 Sep 55, 24p

Unclassified report

Descriptors: (*Extraterrestrial radio waves, Measurement), (*Stars, Extraterrestrial radio waves), (*Radio interferometers, Design), Radio astronomy, Instrumentation, Antennas, Troposphere, Ionosphere, Ratio transmission.

A program is proposed for measuring angular fluctuations in the apparent position of radio stars as a possible method for determining some of the properties of the agency causing the fluctuations. It is suggested that the methodology be based on the use of the radio interferometer and that the first region examined be at a frequency of about 1000 Mc/sec. A discussion is included on the Ryle-type interferometer and its possible modifications, and on some of the factors affecting the design of radio interferometers.

AD-608 012 Div. 30, 2
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
ON A POSSIBLE METHOD FOR MEASURING ELECTRON DENSITY IN THE IONOSPHERE,
by J. N. Cooper. 16 Sep 55, 16p

Unclassified report

Descriptors: (*Electron density, Measuring devices (Electrical and Electronic)), (*Ionosphere, Electron density), (*Measuring devices (Electrical and Electronic), Electron density), Meteorological instruments, Dielectrics, Capacitance, Capacitors, Circuits, Resonance, Feasibility studies.

A possible method of measuring the number of free electrons per unit volume is to find the dielectric constant of the ionosphere between two parallel plates which constitute the capacitative element in a resonant circuit. The elementary theory of such a system is presented and some of the difficulties are discussed.

AD-608 030 Div. 30, 12, 25
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Inc., Los Angeles, Calif.
APPLICATION OF THE MECHANICAL IMPEDANCE CONCEPT TO SHOCK AND VIBRATION TESTING.
Revised ed.,
by Charles T. Morrow. 9 Mar 60, 18p

Unclassified report

Descriptors: (*Test methods, Acoustic impedance), (*Guided missiles, Test methods), (*Vibration, Test methods), (*Shock (Mechanics), Test methods), Airframes, Loading (Mechanics), Feedback, Power amplifiers.

Until recently, the mechanical impedance concept has been ignored in connection with shock and vibration. In testing, the applications must be carefully planned. One compromise is to operate the shaker as an approximation to an infinite-impedance or a zero-impedance source according to the relationship of the average impedance of the tested item of equipment fo that of the structure o

which the item is attached while in use. If a zero-impedance source is favored, it is desirable to make a transition to infinite-impedance at the lowest frequencies. Impedance is controlled simply by equalization. Another compromise is to adjust the spectrum of motion prior to mounting the equipment to be tested and require that the impedance of the shaker correspond to an upper envelope of the impedance of the structure on which the item is to be used. This involves a complicated servomechanism problem which must be solved for each test fixture and perhaps for each item to be tested. Simulating the exact impedance of the structure rather than an envelope is not feasible. (Author)

AD-608 047 Div. 30, 9, 25
OTS Prices: HC $2.00/MF $0.50

Air Force Flight Dynamics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
THE DESIGN OF A DIFFUSER AND HEAT EXCHANGER FOR A FOUR MEGAWATT ELECTROGASDYNAMIC TEST FACILITY,
by James T. Van Kuren. Sep 64, 34p
Proj. 1426, Task 142608
FDL TDR64 93

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Diffusers, Hypersonic wind tunnels), (*Heat exchangers, Hypersonic wind tunnels), Wind tunnels, Test facilities, Aerodynamic heating, Gas flow, Electric arcs, Thermodynamics, Test equipment, Design, Mechanical drawings, Mechanical engineering.

The design of a diffuser and heat exchanger for a hypersonic aerodynamic test facility is presented in detail. This diffuser and heat exchanger are an integral part of the Flight Dynamics Laboratory Four Megawatt Electrogasdynamic Test Facility. Convective heat flux from 9000F air to the diffuser wall and heat exchanger tubes is analyzed. Thermal and mechanical stresses are predicted as part of a complete design. Auxiliary equipment required to give a complete cooling system is described. (Author)

AD-608 048 Div. 30, 6, 15, 18, 31
OTS Prices: HC $3.00/MF $0.75

Ohio State Univ., Columbus. Engineering Experiment Station.
THE DEVELOPMENT OF A METHODOLOGY FOR THE ANALYSIS OF COMPLEX MAN-MACHINE SYSTEMS.
Annual rept. no. 1,
by Daniel Howland, Donald R. Edmonds, and Henry D. Colson. Jul 64, 76p OSURF RF-1643
Contract Nonr495 28, Proj. NR276 005

Unclassified report

Descriptors: (*Systems engineering, Scientific research), (*Weapon systems, Analysis), Mathematical models, Fire control systems, Targets, Detection, Cybernetics, Performance (Engineering), Feasibility studies, Submarines, Effectiveness, Undersea warfare.

The objective of this research is to develop a methodology for the construction of models of complex man-machine systems. The methodology combines observation and measurement of existing systems with logical agrument to relate these measures in the tradition of the hypothetico-deductive methods. Procedures were developed for extending the classic methods of science from the controlled laboratory environment to the real world. In order to develop a general view of system phenomena, inductive methods are employed. A representative system, the ASW submarine weapon-system, was studied. (Author)

AD-608 053 Div. 30, 2, 4, 8, 15
OTS Prices: HC $3.00/MF $0.75

Applied Physics Lab., JHU, Silver Spring, Md.
GUIDE TO THE LITERATURE OF ENGINEERING, MATHEMATICS, AND THE PHYSICAL SCIENCES.
Second ed.,
by Sylvia Goldman. May 1964, 90p TG-230-B3
Contract NOw62 0604c

Unclassified report

Descriptors: (*Engineering, Bibliographies), (*Mathematics, Bibliographies), (*Physics, Bibliographies), (*Bibliographies, Scientific research), Aeronautics, Astronautics, Chemical engineering, Mechanical engineering, Electronics, Electrical engineering, Computers, Astronomy, Geophysics, Acoustics, Ballistics, Fluid mechanics.

The second edition is a selected bibliography which emphasizes the areas of science and engineering of primary importance to staff members of the Applied Physics Laboratory. The first edition included material published from 1953 through 1959. The second edition updates the material through 1963. The abstracting journals and indexes are listed alphabetically by title. Periodicals are arranged by subject and listed alphabetically by title in each subject category. In every case, the date of the first issue and publisher is included in the citation. Reference works are organized not by subject but by type of materials, such as dictionaries and glossaries, encyclopedias, handbooks and manuals, and mathematical tables. Items are listed alphabetically by author; citations include author, title, edition, place, publisher, and date of publication. General books are organized by subject and listed alphabetically by author, with the same bibliographic information as is cited for reference materials. The author index, a new feature in the second edition, is included to facilitate the use of the bibliography. (Author)

AD-608 057 Div. 30
OTS Prices: HC $4.00/MF $1.00

Mitre Corp., Bedford, Mass.
USER'S MANUAL FOR THE COMPUTERIZED ELECTRONIC SYSTEM COST MODEL,
by T. J. Jannsen, H. Glazer, and J. C. Des Roches.
Oct 64, 142p TM-03651
Contract AF19 628 2390, Proj. 850 0
ESD TDR63 446

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Data processing systems, Costs), Computers, Programming (Computers), Data storage systems, Input-output devices, Punched cards, Computer logic, Control sequences, Systems engineering, Compilers, Specifications, Tables, Instruction manuals, Operations research, Programming languages.

The Economic Factors Department of MITRE has developed a computerized electronic system cost model as part of its work in system cost methodology. This document describes the initial version of the model and gives instructions for the electronic data processing procedures, including presentation of the key punch input forms, computer output formats, and a description of the computer program logic. The model, currently operational, has been

programmed for the IBM 7090 computer requires a 32,768 register core memory. The objectives of this manual are to provide a Primer for the cost analyst, and a Reference Manual for the detailed operations on the use of the model. (Author)

AD-608 065 Div. 30
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
USER'S MANUAL FOR THE COMPUTERIZED ELECTRONIC SYSTEM COST MODEL: 7030 MODIFICATIONS,
by B. L. Moores. Oct 64, 34p
TM/03651/0000/00/1/00
Contract AF19 628 2390, Proj. 850 0
ESD TDR64 126, ESD TDR63 446suppl.
Unclassified report

Descriptors: (*Data processing systems, Costs), Computers, Programming (Computers), Data storage systems, Input-output devices, Punched cards, Control sequences, Systems engineering, Compilers, Operations research, Instruction manuals, Programming languages.

A computerized electronic system cost model was developed by the Systems Analysis Department and documented in ESD-TDR-63-446. The present document describes the changes which resulted from converting the computer program for the model from FORTRAN II for the IBM 7090 to FORTRAN IV for the IBM 7030, and from implementing several operational improvement. (Author)

AD-608 077 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TAPE-DRIVE ASSEMBLY FOR MAGNETIC TAPES IN THE M-2 COMPUTER,
by V. D. Knyazev and V. N. Sakharov. 30 Oct 64, 20p
FTD MT64 231; TT 64 71686
Unclassified report

Edited machine trans. of Tsifrovaya Tekhnika i Vychislitel'nye Ustroistva (USSR) 1962, no. 2, p.88-97.

Descriptors: (*Magnetic tape, Electromagnetic drives), (*Drives, Magnetic tape), Computers, Computer storage devices, Magnetic recording systems, Control systems, Computer logic, Wiring diagrams, Mechanical drawings, USSR.

The tape-drive assembly is designed for sliding the magnetic tape under read-record heads in accordance with instructions, arriving from control block of memory unit. In the tape-drive assembly there is realized also direct recording of information on tape and reading of information.

AD-608 086 Div. 30, 16
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INVESTIGATION INTO THE ROLE OF CORTICAL COMPUTING UNIT IN HUMAN VISUAL PATTERN RECOGNITION.
Master's thesis,
by Oscar Eugene Williams, Jr. Aug 64, 186p
AFIT GE/EE/64-22
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Visual perception, Programming (Computers)), (*Digital computers, Simulation), (*Pattern recognition, Digital computers), Nerve cells, Cerebral cortex, Brain, Data storage systems, Input-output devices, Equations.

It has been postulated that the neurons in the cerebral cortex are arranged so that the cortex is functionally a sheet of individual computing units coupled together horizontally and processing information perpendicularly through the sheet in a process described mathematically as correlation. A digital computer model is developed which simulates the proposed correlation function performed by the human visual system and is evaluated on the IBM 1620 and IBM 7094 digital computers. The computer model performs: (1) storage of a number of patterns; (2) correlation between input and stored patterns; (3) pattern translation correction; (4) pattern recognition; (5) pattern similarity recognition and short term memory simulation; (6) memory allocation. Recommendations are made for Fourier transform analysis, pivoted pattern analysis, and magnification effect correction. (Author)

AD-608 125 Div. 30, 14
OTS Prices: HC $3.00/MF $0.75

Pittsburgh Plate Glass Co., Pa.
CORRELATION OF THE DSR WITH THE STRENGTH OF GLASS OF DIFFERENT COMPOSITIONS AND CONFIGURATIONS.
Final technical rept. for 1 Jul 63-30 Jun 64,
by R. W. Ansevin. 7 Aug 64, 98p
Contract AF33 657 11219, Proj. 7381, Task 738102
ML TDR64 180
Unclassified report

Descriptors: (*Refractometers, Tests), (*Glass, Non-destructive testing), Surfaces, Compressive properties.

The Differential Surface Refractometer, and instrument based on the principles of surface refractometry, and modifications of this instrument as required to extend its usefulness to other glass types, is capable of determining the magnitude of the surface compression, in psi, present on tempered glass by nondestructive means. Since the strength of glass is dependent upon the strength of its surface, this ability to measure the surface compression of tempered glass enables one to assess the strength of this glass without the need for destructive tests. This report has demonstrated the correlation of the DSR readings with the strength of tempered glass of four different compositions: Type I MIL-G-25667 glass, PPG Polished Plate; Chemcor Glass, Corning Glass Company Code 0311; Herculite II Glass, PPG No. 7265; Alumino Silicate, PPG No. 6695. (Author)

AD-608 132 Div. 30, 2, 20
OTS Prices: HC $4.00/MF $0.75

Geophysical and Polar Research Center, Univ. of Wisconsin, Madison.
THE ELSEC WISCONSIN DIGITAL RECORDING PROTON PROCESSION MAGNETOMETER SYSTEM.
Research rept. series,
by Richard J. Wold. Jun 64, 104p GPRC-RR-64-4
Contract Nonr1202 16, Grant NSF G12310
Unclassified report

Descriptors: (*Magnetometers, Design), (*Digital recording systems, Magnetometers), (*Protons,

Magnetometers), Punched tape, Programming (Computers), Terrestrial magnetism, Measurement.

The design and construction of a digital recording proton precession magnetometer system is described. The primary data output is punched tape, which is easy to handle and can be fed directly into a computer. Samples of the various data outputs, the computer programs used for decoding the punched tapes, and all schematics and photographs of the system are presented. (Author)

AD-608 147 Div. 30, 25
OTS Prices: HC $2.00/MF $0.50

AVCO-Everett Research Lab., Everett, Mass.
CURRENT SHEET TILT IN A RADIAL MAGNETIC SHOCK TUBE.
Research rept.,
by Rolf B. Johansson. Sep 64, 28p Avco RR-189
Contract AF49 638 659, Proj. 9752, Task 9752 01
Unclassified report

Descriptors: (*Plasma physics, Shock tubes), (*Shock tubes, Plasma physics), Magnetic pinch, Argon, Hydrogen, Particle accelerators, Gases, Ionization, Magnetohydrodynamics.

This paper describes an experiment carried out in a radial (inverse pinch) shock tube with argon of 50 - 400 micron pressure and hydrogen of 100 micron pressure. The current sheet was found to be tilted so that the cathode side lagged the anode side. At the anode the shock has a tilt in the same direction as the current sheet. At the cathode the shock is normal. These phenomena can be correlated by physical models which assume that the current is predominantly carried by the ions. (Author)

AD-608 155 Div. 30
OTS Prices: HC $4.00/MF $1.00

Lockheed Missiles and Space Co., Palo Alto, Calif.
MULTIPLE SHIFT REGISTER REALIZATIONS OF SEQUENTIAL MACHINES,
by A. J. Nichols, III. Oct 64, 136p Lock-6-74-64-48
Unclassified report

Descriptors: (*Computers, Synthesis), (*Computer storage devices, Computer logic), (*Computer logic, Computer storage devices), Switching circuits, Sequences, Input-output devices.

The study is concerned with the problem of mechanizing synchronous sequential machines with shift registers. It is shown that any machine can be mechanized with shift registers. The determination of the least number of shift registers required in a mechanization of a given machine is investigated. A 20-step algorithm, suitable for programming on a digital computer, is developed which starts with the state table of the given machine and yields mechanizations having the least possible number of shift registers. The application of the algorithm to systems design is considered, and a method is given for decomposing the system, designing each of the submachines, and then combining these designs into a mechanization of the system. In addition, it is demonstrated that the algorithm may be applied to logic systems having three or more values as opposed to the conventional, binary system. (Author)

AD-608 157 Div. 30, 8
OTS Prices: HC $3.00/MF $0.75

Chicago Univ., Ill.
AN INTRODUCTION TO THE THEORY OF ADAPTIVE PATTERN RECOGNITION,
by Hugo M. Martinez and H. D. Landahl. 1 Oct 64, 66p
Contract AT11 1 614; Grant AF AFOSR370 63
Unclassified report

Rept. on Application of Information Theory to the Nervous System.

Descriptors: (*Pattern recognition, Theory), Control systems, Artificial intelligence, Computer logic, Communication theory, Linear systems, Stochastic processes, Probability, Matched filters, Reviews.

An introduction to the theory of adaptive pattern recognition is presented having a scope intended to serve as a bridge between the general type of survey and the specialized works. Little or no experience of the field is assumed. There are three sections. The first is devoted to the concepts of adaptive system, pattern and pattern recognition, with due attention to establishing a relevant framework and terminology. The next section discusses in some detail some of the analytical problems inherent to the generic pattern recognition devices known as adalines, perceptrons, matched filters, and stochastic classifiers. The final section gives a brief resume of the notion of separability and of the establishment of certain conditions for its attainment by means of linear and quadratic discriminant functions. (Author)

AD-608 173 Div. 30, 13, 17, 25
OTS Prices: HC $0.75/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
NCEL DYNAMIC TESTING MACHINE.
Task progress rept. for Jan 61-Dec 63,
by W. L. Cowell. 30 Oct 64, 35p
Proj. Y F008 08 03 401
NCEL R331; DASA 13 062
Unclassified report

Descriptors: (*Test equipment, Loading (Mechanics)), (*Loading (Mechanics), Test equipment), (*Steel, Loading (Mechanics)), Chromium alloys, Tensile properties, Stresses, Ductility, Mechanical properties, Statics, Deformation, Structures, Materials.

This report describes the dynamic testing machine at NCEL and gives the results of dynamic tests conducted on a chrome-alloy steel. These results are compared with results obtained by other high-speed testing machines. At a strain rate of 2 inches per inch per second, the chrome-alloy steel shows an increase in the upper yield stress of approximately 25 percent compared to the average static value. A general increase in tensile strength (between 6 and 7 percent greater than static values) is evident with an increase in head velocity. No change in ductility could be detected. (Author)

AD-608 252 Div. 30, 6, 14
OTS Prices: HC $4.00/MF $1.00

General Dynamics/Fort Worth, Tex.
RADAR CROSS SECTION TARGET SUPPORTS, PLASTIC MATERIALS.
Rept. no. 6 (Final),
by C. H. Smith, C. C. Freeny, E. F. Knott, and T. B. A. Senior. Jun 64, 136p FZE-222-6
Contract AF30 (602) 2831, Proj. 6503
RADC TDR64 381
Unclassified report

Prepared in cooperation with Michigan Univ., Ann Arbor, under subcontract.

Descriptors: (*Radar echo areas, Test equipment), (*Expanded plastics, Scattering), (*Radar targets, Supports), Styrene plastics, Structural properties, Mathematical models, Inflatable structures, Plastics, Measurement, Cylindrical bodies, Conical bodies, Aerospace craft.

The results of studies into the scattering properties of cellular plastic materials are presented. A mathematical model for scattering from cellular plastics, developed to provide a method of determining the optimum low cross section target support for a given application is also presented. The results of investigations of field perturbations near a Styrofoam surface are described along with cross section measurements using theoretical minimum cross section formula for circular target supports. Structural considerations in the use of Styrofoam as target support material are discussed. Methods for achieving low cross section bonds between pieces of Styrofoam are also discussed. The results of a limited study of the feasibility of air inflated structures as target supports are also presented. (Author)

AD-608 272 Div. 30, 5, 8
OTS Prices: HC $3.00/MF $0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE HAYSTACK EXPERIMENTAL FACILITY,
by H. G. Weiss. 15 Sep 64, 64p LL-TR-365
Contract AF19 628 500
ESD TDR64 378

Unclassified report

Descriptors: (*Laboratories, Radar), (*Parabolic antennas, Scientific research), Laboratory equipment, Microwave frequency, Space communication systems, Radar antennas, Radio astronomy, Laboratories, Radomes, Electronic equipment, Control systems, Drives, Radiometers, Power supplies, Instrumentation.

A new ground station for space communications, radar and radio astronomy research has recently been completed at Tyngsboro, Massachusetts. This installation, which is named Haystack, employs a 120-foot-diameter fully steerable antenna enclosed in a metal space-frame radome. Advanced design and construction techniques have been developed to achieve a reflector with a very precise parabolic contour. The antenna will operate very efficiently at wavelengths of 3 cm and will also provide a useful capability at wavelengths as short as 8 mm. The antenna incorporates a 'plug-in' equipment room behind the reflector which makes it possible to conveniently utilize the antenna for a variety of both active and passive experiments. At the highest operating frequency, the half-power width of the antenna beam will be less than 0.02 degrees. To provide appropriate control for this very narrow antenna beam, a general-purpose digital computer has been integrated into the facility. The RF configuration of the antenna is compatible with the use of high-power transmitters and cooled, low-noise receiving equipment. A versatile 1-Mw average power, high-voltage supply has been provided for energizing transmitting equipment. This new installation will provide a unique capability in the microwave portion of the spectrum for communications, radar and radio astronomy. (Author)

AD-608 276 Div. 30, 25
OTS Prices: HC $3.00/MF $0.75

Sperry Gyroscope Co., Great Neck, N. Y.
INVESTIGATION OF TECHNIQUES FOR ELECTRO-MAGNETIC ANGULAR ROTATION SENSING.
Interim engineering rept. no. 1, 1 Jul-30 Sep 64.
Oct 64, 68p AB-1272-0028-1
Contract AF33 615 1931. Proj. 4427, Task 442704

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Centrifuges, Instrumentation), (*Lasers, Stabilization), Rotation, Electromagnetic fields, Optical equipment, Control systems, Rings, Oscillation, Resonators, Thermal properties, Mechanical properties.

A ring laser angular rotation sensor is being designed for 100g centrifuge operation. Mode stabilization and control studies are aimed at improving the rotational sensitivity of the ring. Information on mode stability and number of simultaneously oscillating modes was being investigated through the use of an analyzing Fabry-Perot cavity. Work on mode pulling and locking, including computer results, is included. The primary emphasis of the program is on designing, evaluating, and delivery ring laser systems for the Holloman 100g, 260-inch centrifuge. Considerations include thermal and mechanical stability. (Author)

AD-608 279 Div. 30, 25
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
DESIGN, ADJUSTMENT, AND OPERATION OF AN OFF-AXIS SCHMIDT SPECTROGRAPH FOR PLASMA APPLICATIONS,
by E. J. Eastmond and E. B. Turner. 10 Sep 64, 48p
TDR-269(4280-40)-1
Contract AF04 695 269
SSD TDR64 170

Unclassified report

Descriptors: (*Spectrum analyzers, Plasma physics), (*Plasma medium, Spectroscopy), Spectrophotometers, Spectrographic cameras, Photographic film, Photomultipliers, Camera components and accessories, Mirrors, Operation, Design.

A large aperture spectrograph designed for plasma research applications at the Aerospace Corporation is described. This instrument, which uses and off-axis Schmidt optical system, has a relative aperture of f/6 and a dispersion of 2 A/mm in the first order. Either photographic film or photomultiplier tubes may be used to record the spectra. The design and characteristics of the optical system are discussed, and a detailed description is given of the alignment and adjustment procedure which is somewhat different from that of conventional spectrographs. The operation of the instrument, which includes the use of the photographic camera, the photomultiplier readout head, and the setting of the plane gratings for various spectral ranges is described in sufficient detail so that this report can be used also as a laboratory manual. Several sample spectra which may be used as reference standards are shown. Finally, examples are given of applications for which the spectrograph has been used. (Author)

AD-608 280 Div. 30, 2, 8, 16, 25, 32
OTS Prices: HC $6.00/MF $1.25

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
QUARTERLY PROGRESS REPORT NO. 75. RADIO PHYSICS, PLASMA DYNAMICS, AND COMMUNICATION SCIENCES AND ENGINEERING,
by H. J. Zimmermann and G. G. Harvey. 15 Oct 64, 254p
Contract DA36 039AMC03200E, AT30 1 1842

Unclassified report

Descriptors: (*Reports, Scientific research), (*Scientific research, Reports), (*Electronics, Scientific research), Microwave spectroscopy, Radio astronomy, Infrared spectroscopy, Geophysics, Magnetic resonance, Acoustics, Plasma physics, Magnetohydrodynamics, Energy conversion, Communication theory, Speech transmission, Speech recognition, Biophysics, Neurology, Nervous system, Physiology, Networks, Theorems.

AD-608 284 Div. 30, 16
OTS Prices: HC $4.00/MF $0.75

Ohio State Univ., Columbus. Research Foundation.
ON THE STRUCTURE AND ORGANIZATION OF THE NERVOUS SYSTEM FROM AN INFORMATION PROCESSING POINT OF VIEW (NEURAL CODING, VISION, AND MOTORCONTROL).
Final rept. for Oct 62-Mar 64,
by N. A. Coulter, Jr. Oct 64, 106p
Contract AF33 657 9660, Proj. 7233, Task 723304
AMRL TR64 80

Unclassified report

Descriptors: (*Central nervous system, Bionics), (*Bionics, Central nervous system), (*Data processing systems, Bionics), Nerve cells, Physiology, Visual signals, Visual perception, Colors, Images, Focusing, Intensity, Space perception, Stabilization, Servomechanics, Neuromuscular transmission, Cerebral cortex, Cerebellum, Brain, Retina, Biophysics, Cybernetics, Posture, Probability, Differential equations.

A study was made of the central nervous system from an information processing point of view. The study entailed a review and critical analysis of several hundred references, and involved a considerable amount of recasting and reorganization of existing knowledge into the terms and concepts of engineering, with particular reference to potential bionic applications. The study was selective rather than comprehensive. The neural coding problem was first examined, the history of efforts dealing with this problem was reviewed, and a mathematical representation of neural signals (neurograms) and neural operators was formulated. The processing of data by the visual system was then described, with particular reference to form, color, and movement detection, the temporal continuity of visual objects, image fixation, automatic focussing control, intensity control, image fusion, depth perception, and the stabilization of visual space. Next, the neural control of movement was analyzed from a servomechanical viewpoint. The unit biomechanical control system was defined, and the corticospinal command of this unit system was discussed. The cerebellar coordination and extrapyramidal stabilization of sequences and combinations of biomechanical control unit actions was examined. (Author)

AD-608 289 Div. 30, 2, 5, 6
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
HAYSTACK POINTING SYSTEM: INTERPOLATION,
by R. Teoste. 28 Oct 64, 32p LL-1964-57
Contract AF19 628 500
ESD TDR64 565

Unclassified report

Descriptors: (*Compilers, Position finding), (*Radio antennas, Programming (Computers)), (*Programming (Computers), Radio antennas), (*Laboratories, Radar), Azimuth, Ranges (Distance), Doppler systems, Height finding, Tracking, Radar antennas, Radio astronomy, Computers.

The Haystack antenna is pointed by means of a Univac 490 Computer. In the Pointing System program is incorporated an interpolation routine to provide pointing information 250 times a second. This report describes the interpolation routine. (Author)

AD-608 306 Div. 30
OTS Prices: HC $3.00/MF $0.75

Adaptronics, Inc., Alexandria, Va.
STUDY OF NEUROTRON NETWORKS IN LEARNING AUTOMATA. VOLUME I: LEARNING AUTOMATA AND THE NEUROTRON.
Final engineering rept., vol. 1, 15 Feb 63-15 Feb 64,
by L. O. Gilstrap, Jr., A. C. Chauliagon, H. J. Kempa, and R. E. J. Moddes. 15 Jun 64, 66p
Contract AF33 657 10734

Unclassified report

Descriptors: (*Automata, Learning), (*Artificial intelligence, Nerve cells), (*Networks, Automata), Theory, Design, Construction, Operation, Instruction manuals, Performance (Engineering).

A theory of learning automata, with mathematical formulation, is presented and applied to the development of the Experimental Neurotron (a neuromine with the ability to learn both analog and logical functions). Construction of this neuromime is detailed and logic and circuit diagrams are presented. This volume also includes a detailed manual of operation for the Experimental Neurotron. No extensive discussion of applications is staged. (Author)

AD-608 307 Div. 30
OTS Prices: HC $3.00/MF $0.75

Adaptronics, Inc., Alexandria, Va.
STUDY OF NEUROTRON NETWORKS IN LEARNING AUTOMATA. VOLUME II: COMPUTER SIMULATION.
Final engineering rept., vol. 2, 15 Feb 63-15 Feb 64,
by R. F. Snyder, R. J. Brown, and R. E. J. Moddes.
15 Jun 64, 66p
Contract AF33 657 10734

Unclassified report

Descriptors: (*Automata, Learning), (*Artificial intelligence, Nerve cells), (*Networks, Programming (Computers)), Simulation, Computers, Control sequences.

Descriptions and flow diagrams for the simulation of a Neurotron (a neuromime with the ability to learn both analog and digital functions) network are presented. The program has been prepared for the IBM 7094 Computer and is encoded in a subroutine complex in FORTRAN IV and Macro-Assembly Program code (MAP) for use with the IBM IBJOB Monitor System. Although exact applications to learning and goal situations are not included, these aspects are discussed to a degree that allows complete use of the simulation vehicle in specific problem areas. (Author)

AD-608 339 Div. 30, 16
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
RESPIRATORY GAS ANALYSIS WITH A TIME-OF-FLIGHT MASS SPECTROMETER.
Final rept. for Jun 61-Jun 64,
by J. B. Graves and P. R. B. Caldwell. Sep 64, 16p
Proj. 7164, Task 716404
AMRL TR64 84

Unclassified report

Descriptors: (*Mass spectroscopy, Medical research), (*Gas analysis, Respiration), (*Respiration, Gas analysis), Samplers, Performance (Engineering), Oxygen, Spectrum analysers, Aviation medicine, Space medicine.

A modified remote sampling system has been devised for the Bendix Model 17-210 time-of-flight mass spectrometer. This has been adapted for use in measuring respiratory gases breath by breath. The stability of the mass spectrometer output shows a variation of ± 5%. The sensitivity of the system for oxygen is in the range of 0.2% absolute concentration. The accuracy for oxygen is within ± 5%. (Author)

AD-608 340 Div. 30, 25, 14
OTS Prices: HC $3.00/MF $0.75

New Hampshire Univ., Durham. Coll. of Tech.
DESIGN OF EQUIPMENT FOR PROPAGATION OF SHORT STRESS PULSES IN RODS OF VISCOELASTIC MATERIAL. Master's thesis,
by Mayo Carrington, Jr. Jun 64, 68p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Shock waves, Test equipment), (*Polymers, Loading (Mechanics)), (*Viscoelasticity, Polymers), Propagation, Monitors, Rods, Mathematical analysis, Detonators, Transducers, Attenuation, Stresses, Oscilloscopes, Polyethylene plastics.

The general purpose of the work described here is to further develop the understanding of the behavior of high polymers under conditions of dynamic loading. The polymer studied was polyethylene, a viscoelastic solid exhibiting time-dependent effects not found in usual engineering structural materials. A characteristic of these interesting viscoelastic solids is that a stress pulse moving through the medium is both attenuated and spread out in time. For these reasons the material has seen application in the design of shock and vibration isolation mounts. The specific objective of the work described in this thesis was to design and construct apparatus capable of generating and monitoring very short stress pulses in a slender, viscoelastic, cylindrical rod. The apparatus was calibrated and its performance tested. Preliminary data was obtained on viscoelastic rods. The stress pulse was initiated by detonation of explosives at one end of the rod and the corresponding displacement of the other end measured by a variable capacitance transducer. (Author)

AD-608 364 Div. 30, 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RECORDING LISSAJOUS FIGURES,
by Ivan L. Finkle. Nov 64, 16p P-3003
Unclassified report

Descriptors: (*Computers, Recording systems), (*Programming, (Computers), Recording systems), (*Harmonic analysis, Graphics), Physics, Programming languages.

The figures or diagrams resulting on describing the path of a particle undergoing the motion of a damped double pendulum were derived by using an IBM-7044 computer and a Stromberg-Carlson 4020 printer-plotter. The starting point and end point data of each line segment were input to the 4020 on a magnetic tape produced by the 7044 from a program written in Fortran IV. The results compared well with those of W. B. Hales ('Recording Lissajous Figures', J. Accoust. Soc. Am., 16 (1945) 137-146). The experiment demonstrates the use of computing machines and simple programming techniques to illustrate physical properties.

AD-608 367 Div. 30, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE LOGIC OF INTERROGATING A DIGITAL COMPUTER,
by M. E. Maron. Nov 64, 24p P-3006
Unclassified report

Presented at the 1964 Linguistic Institute of the Linguistic Society of America, Univ. of Indiana, Bloomington.

Descriptors: (*Digital computers, Computer logic), (*Computer logic, Digital computers), Language, Artificial intelligence, Cybernetics, Communication theory, Information retrieval, Probability, Mathematical logic.

The topics discussed in this paper are (1) the information sciences, (2) interrogating a digital computer, (3) data retrieval systems, and (4) cybernetics, meaning, and comprehension.

AD-608 369 Div. 30, 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE APPLICATION OF PHOTOELASTICITY TO PERCUSSION STUDY,
by Jean Thouvenin. 27 Oct 64, 6p
RSIC 319; TT 65 60109
Unclassified report

Trans. of Academie des Sciences, Paris. Comptes Rendus (France) 1935, v. 201, no. 1, p. 769-771 (pub. by Gauthier-Villars et Cie., Paris).
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photoelasticity, Stresses), (*Stresses, Measurement), France, Glass, Impact shock, Test methods.

A device was developed for using photoelasticity to indicate such rapidly moving stress patterns as those produced by impact on a transparent plate. The optical technique makes use of light to encounter a circular polarizer, a model placed against a 1-meter-radius concave mirror, a circular analyzer, and an objective forming the image of the model on film that is carried on a uniformly revolving drum. The light source is a spark gap between zinc spheres, the sparks having a frequency of about 4000 per second. They are furnished by charge and discharge of a 0.16-microfared capacitor, connected by a reversing switch to a 8-microfarad capacitor charged to 8000 switch.

AD-608 374 Div. 30, 2
OTS Prices: HC $4.00/MF $1.00

Bollay (E.) Associates, Inc., Goleta, Calif.
INSTRUMENTATION FOR THE DIRECT MEASUREMENT OF FOG DROPLET GROWTH.
Final rept.,
by Robert A. Begun. Aug 64, 144p
Contract ARDS554, Proj. 131 311 05A, Task 9
FAA RD64 136 Unclassified report

Descriptors: (*Meteorological instruments, Fog), (*Fog, Meteorological instruments), Optical equipment, Ultraviolet radiation, Weather forecasting, Water, Drops, Growth, Meters.

An instrument is in operation that directly measures water droplet growth as a precursor of developmental fog formation. Its potential was recognized as a result of the mesoscale prediction work being done by our company in support of ATC operations at high density air terminals. Water droplet sizes of interest range from 0.1 to 1.0 microns, prior to the particles becoming visible to the human eye. Using optical techniques, the instrument measures the transmission of two discrete wavelengths of ultraviolet light over a path length of 125 feet. The atmosphere is not disturbed. As the absolute value of the transmission is not quantitatively measured, the alignment of the unit is not critical. Several cases of developmental fog were successfully indicated by the instrument several hours before visibility was affected. (Author)

AD-608 403 Div. 30, 15
OTS Prices: HC $3.00/MF $0.50

RIAS, Inc., Baltimore, Md.
SOME MATHEMATICAL CONSIDERATIONS ON NONLINEAR AUTOMATIC CONTROLS,
by Solomon Lefschetz. Apr 62, 52p
RIAS-TR-62-10
Contracts AF49 638 382, DA36 034ORD3514RD
AFSOR 2501

Unclassified report

Descriptors: (*Control systems, Mathematical analysis), Nonlinear systems, Automatic, Control, Feedback, Matrix algebra, Vector analysis, Differential equations, Functional analysis, Real numbers, Stability.

AD-608 421 Div. 30, 23, 26, 28
OTS Prices: HC $2.00/MF $0.50

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
THE DECISION SCIENCES LABORATORY PROGRAM OF TECHNIQUES AND FACILITIES FOR AUTOMATING RESEARCH,
by Emir H. Shuford, Jr. Sep 64, 48p
Proj. 4690, Task 469003
ESD TDR64 553

Unclassified report

Descriptors: (*Laboratories, Decision making), (*Computers, Decision making), (*Decision making, Scientific research), Management engineering, Behavior, Performance (Human), Data processing systems, Training, Simulation, Information retrieval, Statistical analysis, Control systems, Automation.

A report is given on the application of techniques and the use of computer facilities in automating research in the Decision Sciences Laboratory. Applications are divided into six categories; (1) real-time control of experimental tasks performed by human subjects, (2) statistical analysis of experimental data, (3) stimulation and sensitivity analyses, (4) studies in information retrieval, (5) techniques for improving the man/computer interface, and (6) computer-based personnel selection, classification, training, and proficiency testing. Examples are given of each application. There is also included detailed facility lay-out and description of equipment characteristics. (Author)

AD-608 426 Div. 30, 14
OTS Prices: HC $3.00/MF $0.75

Polacoat, Inc., Blue Ash, Ohio.
SYNTHESIS OF INORGANIC PHOTOTROPIC MATERIALS FOR HIGH DENSITY COMPUTER MEMORY APPLICATIONS.
Rept. for 1 May 63-30 Apr 64,
by R. Radler and C. Chenot. Oct 64, 82p
Contract AF33 657 11510, Proj. 7062, Task 706201
AL TDR64 170

Unclassified report

Descriptors: (*Computer storage devices, Materials), Inorganic compounds, Glass, Synthesis (Chemistry), Refractive index, Spectroscopy, Spectra (Infrared), Impurities, Cerium, Color centers, Sulfides, Oxides, Potassium, Silicon.

The report is a detailed description of the research performed to develop a transparent tenebrescent glass filter which would have potential as an optical memory for digital computers. A technique is described by which a nearly transparent hackmanite--type glass was prepared. The technique makes use of the precipitation of a tenebrescent phase from a glass matrix. Infrared absorption curves, analytical results and the effects of compositional variations are discussed. The development of a rare earth doped potassium glass is also described along with its optical properties and compositional variations. (Author)

AD-608 427 Div. 30
OTS Prices: HC $4.00/MF $0.75

Librascope Div., General Precision, Inc., Glendale, Calif.
ASSOCIATIVE PROCESSOR STUDY.
Interim rept.,
by Richard H. Fuller, Richard M. Bird, and Jack N. Medick. Oct 64, 109p
Contract AF30 602 3371, Proj. 5581, Task 558109
RADC TDR64 437

Unclassified report

Descriptors: (*Pattern recognition, Digital computers), (*Digital computers, Pattern recognition), (*Programming (Computers), Pattern recognition), Computer logic, Control sequences, Information retrieval, Numerical methods and procedures, Artificial intelligence, Input-output devices, Word association, Correlation techniques.

The application of a new concept of machine organization for non-numerical problems to the problem of pattern recognition and classification using associate techniques is studied. The one year contract will involve the study of using this new machine concept of associative processing for different non-numerical application areas. The first area studied which this report covers is the application to pattern recognition and processing. A quantitative evaluation of the associative techniques to these particular application areas is presented. A pattern processor is described which both extracts properties and classifies patterns by means of the preferred techniques. (Author)

AD-608 433 Div. 30
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
IMPURITIES IN A VACUUM.
Instrumentation Paper,
by Jerome H. Bloom, Charlotte E. Ludington, and Robert L. Phipps. May 64, 27p
Proj. 5621
AFCRL 64 377; AFCRL IP50

Unclassified report

Descriptors: (*Vacuum, Impurities), Vacuum apparatus, Gases, Mass spectroscopy, Spectrum analyzers, Mass spectrum.

The effect and cause of impurities are of great concern to high ultra-high vacuum researchers. As most vacuum gauges measure only total pressure, a partial pressure analyzer must be used to detect and analyze residual gases. Four types of analyzers are discussed in relation to their operation, useful total and partial pressure ranges, mass range, advantages, etc. Some effects and causes of impurities are given. Spectra showing some of the various impurities found in vacua are discussed. (Author)

AD-608 438 Div. 30
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
RESEARCH AND DEVELOPMENT OF AN AUTOMATIC BERYLLIUM AND BORON MONITOR.
Final rept., phase 1, 30 Jun 61-10 May 62,
by R. S. Braman. 8 Jun 62, 89p IITRI-3203-3
Contract AF04 611 7543, Projs. C203, 3850, Task 38506
Unclassified report

Descriptors: (*Gas detectors, Boranes), (*Boranes, Gas detectors), (*Beryllium Count-rate meters), Warning systems, Flames, Air, Emissivity, Hydrogen, Instrumentation, Radiation alarms, Alpha particles, Performance (Engineering), Monitors.

The design, construction, and final testing of a prototype borane monitor were completed. Detection of boranes in air is based upon the flame emission of boron in a hydrogen-air flame. Sensitivity is in the 50-ppb range. The protoype has ranges of 0 to 2, 0 to 13, and 0 to 60 ppm. Ammonia and hydrazine interfere to the extent that 250 and 360 parts of these, respectively, produce the same effect as 1 part of pentaborane. The borane monitor is portable and is capable of independant operation for approximately 9 hr. The design, construction, and final testing of a prototype beryllium monitor were completed. Detection is based upon the reaction of beryllium with high-energy alpha particles. Beryllium is deposited onto the surface of a filter tape which passes through a detection chamber. Counting rate data from the Be9 (alpha, eta, gamma) C12 reaction are used in two alarm circuits which are activated at two beryllium concentrations. The instrument is capable of sensing 0.25 to 0.5 micrograms of beryllium. It is line operated. (Author)

AD-608 446 Div. 30, 5, 13, 33
OTS Prices: HC $8.65/MF $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CYBERNETICS, AUTOMATION, AND TELEMECHANICS: ANNOTATED BIBLIOGRAPHY,
28 Aug 64, 564p
FTD MT63 191; TT 65 60118
Unclassified report

Edited machine trans. of mono. Kibernetika, Avtomatika i Telemekhanika: Annotirovannyi Ukazatel' Literatury, v. 4, Moscow, 1962, 356p.

Descriptors: (*Cybernetics, Bibliographies), (*Automation, Bibliographies), (*Computers, Bibliographies), (*Instrumentation, Bibliographies), (*Communication systems, Bibliographies), (*Engineering, Bibliographies), (*Transportation, Bibliographies), (*Bibliographies, Scientific research), Documentation, Servomechanisms, Quality control, Electronics, Industrial production, Metallurgy, Economics, Medicine, Photography, USSR.

Contents: Cybernetics; Automatic regulation and control; The theory of relay mechanisms and finite automatic machines; Computer technology; Quality control; Automated electric drive; Telemechanics; Elements of automatic and telemechanical mechanisms; Industrial electronics; Instrument-making; The reliability of systems and components of automation and telemechanics; Automation of industrial processes; Economic effectiveness of automation; Power engineering; Processes of mechanical engineering; Branches of the machine-building industry; Metallurgy; Mining; Petroleum and gas industry; Chemical industry; Food industry; Light industry; Building industry; Agriculture; Transportation; Communications; Commerce; Public economy; Medicine; Motion picture industry.

AD-608 453 Div. 30, 4, 14, 25
OTS Prices: HC $6.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HERALD OF THE LENINGRAD UNIVERSITY, 1963, VOL. 18, NO. 4, PHYSICS AND CHEMISTRY SERIES, NO. 1,
9 Nov 64, 288p
FTD MT64 64; TT 65 60122
Unclassified report

Edited machine trans. of Leningrad Univ. Vestnik (USSR) 1963, v. 18, no. 4, Seriya Fiziki i Khimii, no. 1, p. 1-186.

Descriptors: (*Physics, USSR), (*Chemistry, USSR), (*Glass, Electrochemistry), Elementary particles, Crystals, Copper compounds, Oxides, Quantum mechanics, Photoelectric materials, Isotopes, Spectroscopy, Nuclear magnetic resonance, Solar radiation, Ozone, Electrodes, Ion exchange, Electrolytic cells, Alkaline earth oxides, Alkali metal compounds, Silicates, Rare earths, Yttrium compounds, Titanium compounds, Zirconium compounds, Barium compounds, Lanthanum compounds.

Contents: Axiomatic theory of properties of symmetry of elementary particles; Calculation of discontinuities of amplitudes of transition above the threshold of formation of more than two particles; Frenkel's excitons in a crystal of CuO; Mathematical structure of the quantum theory; Changes of surface potential of PbS layers during illumination; Determination of isotopic composition according to the emission Spectra of Molecules; Spectral-isotopic detection of O2 in metals; Orthogonal compensators of inhomogeneity of magnetic field for a NMR spectrometer; Eclipse effect in the O3 region of the solar spectrum; New presentations of the ion exchange theory of glass electrode; EMF of glavanic cells involving ion-exchange membranes; Investigation of electrode properties and chemical stability of glasses; Influence of oxides of alkali-earth metals on electrode properties and chemical stability of Li-Si and Na-Si glasses. Electrode properties of Li borosilicate and gallosilicate glasses; Electrode properties and chemical stability of Li-Si glasses containing oxides of rare-earth elements and Y2 O3; Plus 8 other articles.

AD-608 458 Div. 30
OTS Prices: HC $3.00/MF $0.75

Naval Postgraduate School, Monterey, Calif.
LINEAR CONTROL SYSTEM OPTIMIZATION USING A MODEL-BASED INDEX OF PERFORMANCE.
Research rept.,
by James S. Demetry and Harold A. Titus.
Nov 64, 60p
NPS,M RP48
Unclassified report

Descriptors: (*Control systems, Optimization), (*Optimization, Control systems), Linear systems,

Performance (Engineering), Feedback, Stability, Dynamics, Perturbation theory, Model theory, Adaptive control system.

This paper deals with a method of optimizing the free coefficients in the characteristic equation of a linear feedback control system. The optimization is carried out by minimizing an index of performance associated with the system's response to a given test disturbance. The index of performance is the integral of quadratic function of the system state variables. The structure of the index rests upon a logical interpretation of the regulator nature of the control problem. The index for an nth order system contains n weighting factors whose values are determined from an nth order model system. This determination is such that the optimization of a completely free system will yeild the model system. A system with fewer than n degrees of freedom in the state variable feedbacks may be optimized with respect to the free feedback coefficients, yielding a system whose dynamic response to a given disturbance is, for this optimization scheme, a best approximation to that of the model. Examples are presented for illustration of the salient features of the method. It is also shown by example that systems with closed-loop zeros may be optimized by this method. (Author)

AD-608 472 Div. 30, 14, 17
OTS Prices: HC $3.00/MF $0.75

Aerojet-General Corp., Sacramento, Calif.
DEFLECTION TRANSMISSION CABLES FOR USE IN THERMAL ENVIRONMENTS IN EXCESS OF 3500F.
Final rept. for 1 Jul 63-31 May 64,
by Allen T. Green and Richard K. Steele. Oct 64,86p

Contract AF33 657 11354, Proj. 1347, Task 134702
FDL TDR64 69

Unclassified report

Descriptors: (*High-temperature research, Test equipment), (*Cables (Mechanical), High-temperature research), (*Thermal expansion, Test equipment), (*Test equipment, Aerospace craft), Deflection, Instrumentation, Coolants, Transducers, Creep, Ceramic materials, Stainless steel, Iron alloys, Nickel alloys, Aluminum compounds, Oxides, Heat transfer, Stresses, Captive tests, Test methods, Structural properties, Mechanical properties, Loading (Mechanics).

A method of transmitting deflections from a test structure at 3500F to a transducer at room temperature was developed. During high-temperature structural tests, accurate test-specimen deflections can only be determined by use of a test specimen-to-transducer link in which thermal expansion and creep are minimal, to the point of being within the required system accuracy, or accountable. The problems involved in accounting for thermal growths of deflection transmission links used during transient heating and specimen motion directed this program to the development of a system in which thermal growths are minimized. The deflection-transmission-cable link developed during this program consists of water-cooled Invar tubes in an assembly that is spring-loaded to contact the test specimen through a replaceable polycrystalline alumina ceramic tip (Lucalox). The deflection link was evaluated under static and quasistatic test-specimen heating rates and specimen temperatures to 3500F and a 1/2-hr exposure time. (Author)

31. Ships and Marine Equipment

AD-608 109 Div. 31
OTS Prices: HC $3.00/MF $0.75

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
STUDY OF THE DESIGN AND BEHAVIOR OF A HYDROFOIL SEMI-SUBMARINE,
by E. M. Uram. Aug 64, 92p SIT-DL-1023
Contract Nonr263 10, Proj. FX2532 007

Unclassified report

Descriptors: (*Submarines, Hydrofoils), Design, Performance (Engineering), Motion, Stability, Submarine hulls, Ocean waves, Tests, Feasibility studies.

The results of a feasibility, design, and experimentally-determined-performance study of an unusual ship design in the 3,000-ton class for high-speed operation in rough waters are presented and discussed. The concept, termed a 'Hydrofoil Semi-Submarine,' is a shallow-running submersible with an Albacore-type main hull incorporating a surface-piercing dihedral hydrofoil system. Test results show that the Hydrofoil Semi-Submarine is, above 35 knots, superior to the conventional destroyer and other novel ship designs, in both horsepower requirement and ship response to wave systems. The results of the program also clearly demonstrate that, with the proper design, this ship concept should pose no serious stability or control problems but should, rather, afford the possibility of much more effective control over the influences of environment than is exhibited by the conventional ship. (Author)

AD-608 116 Div. 31, 25
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
USS ALBACORE (AGSS 569) MODES OF RUDDER VIBRATION,
by Ralph C. Leibowitz. Sep 61, 40p
DTMB 1540

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Marine rudders, Vibration), (*Marine propulsion, Vibration), Propellers (Marine), Propeller blades, Submarines, Ships, Stability, Force (Mechanics), Mathematical analysis, Rotation, Tables, Tests, Frequency.

With the addition of a motor-propeller system to the lower rudder of USS ALBACORE (AGSS 569) the possibility existed that local resonance frequencies of the rudder within the operating speed range of the ship would occur and hence increase the vibratory response of the ship to propeller-blade forces acting on the rudder. Theoretical analysis indicates, however, that the addition of the motor-propeller system to the rudder would not cause excessive vibrations. This conclusion was verified experimentally. (Author)

AD-608 168 Div. 31, 25
OTS Prices: HC $6.00/MF $1.25

IIT Research Inst., Chicago, Ill.
DYNAMICS OF FLEXIBLE ROTORS.
Final rept. for 11 Jun 63-11 Jun 64,
by R. A. Eubanks and R. L. Eshleman. Oct 64,
210p IITRI-K6056
Contract NObs88607

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-408 397.

Descriptors: (*Flexible shafts, Dynamics), (*Dynamics, Flexible shafts), Differential equations, Motion, Equations, Vibrations, Programming (Computers), Bearings.

The present program had several goals. Primary among these was an inquiry into the effect of gyroscopic and rotatory inertial effects on the whirling of rotating shafts. The secondary goals included the development of a computer program for the prediction of whirling of stepped shafts, the completion of an inquiry into an approximate method of analysis which is used widely in Naval predictions of shaft whirling phenomena, and the development of a very versatile and dependable test rig for the experimental investigation of primary and secondary effects in Rotor Dynamics. An appendix contains a complete derivation of equations of motion for shafts which rotate at constant speed. Sections II and III contain analyses of specific shaft systems which were performed with the use of the basic differential equations. The critical speeds and mode shapes were found for a uniform undamped rigidly supported cylindrical rotor with gyroscopic and rotatory inertia effects included. The cylindrical rotor was analyzed in fixed short bearings as well as in fixed long bearings. A second analysis inquired into the cirtical speeds of a system consisting of a single disk loaded at an arbitrary location on a uniform continuous shaft which was mounted on short fixed bearings. In general, it was found that there are two critical speeds for each order of flexible mode shape.

AD-608 194 Div. 31
OTS Prices: HC $4.00/MF $1.00

Netherlands Ship Model Basin, Wageningen.
EXPERIMENTAL AND THEORETICAL RESEARCH ON THE HYDRODYNAMIC CHARACTERISTICS OF LARGE HUB TO DIAMETER RATIO PROPELLERS.
Final rept. for 1 Oct 62-30 Apr 64,
by J. D. van Manen. Jul 64, 136p
Contract N62558 3463

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Propellers (Marine), Hydrodynamics), Shrouded propellers, Submarines, Ship models, Propulsion, Pitch (Motion), Mathematical models, Propeller hubs, Optimization, Control systems, Thrust, Design, Netherlands.

Experimental results are presented of the side force generating characteristics of propellers with a large hub to diameter ratio, due to cyclic pitch variations. The effect of the cyclic pitch on the propeller torque and thrust are examined as well. In addition a theory was formulated for calculation of the properties of large hub to diameter ratio propellers. The theory enables one to optimize the design of the propeller with respect to efficiency. The first numerical results of the theoretical analysis are given. (Author)

AD-608 195 Div. 31, 9
OTS Prices: HC $2.00/MF $0.50

Netherlands Ship Model Basin, Wageningen.

EXPERIMENTAL AND THEORETICAL RESEARCH ON THE HYDRODYNAMIC CHARACTERISTICS OF LARGE HUB TO DIAMETER RATIO PROPELLERS, SUPPLEMENT NO. 1.
Final technical rept., suppl. no. 1.
1964, 29p
Contract N62558 3463

Unclassified report

See also AD-608 194.

Descriptors: (*Submarines, Hydrodynamics), (*Propellers (Marine), Tests), Force (Mechanics), Moments, Propeller hubs, Ship models, Configuration, Graphics, Netherlands.

The forces and moments acting on the submarine body without propeller blades were measured during the resistance tests for the following submarine configurations: submarine without forward shroud and aft shroud fitted, submarine with both forward and aft shroud fitted, and submarine without both forward and aft shroud.

AD-608 196 Div. 31, 9
OTS Prices: HC $3.00/MF $0.75

Netherlands, Ship Model Basin, Wageningen.
EXPERIMENTAL AND THEORETICAL RESEARCH ON THE HYDRODYNAMIC CHARACTERISTICS OF LARGE HUB TO DIAMETER RATIO PROPELLERS, SUPPLEMENT NO. 2.
Final technical rept., suppl. no. 2.
1964, 81p
Contract N62558 3463

Unclassified report

See also AD-608 194.

Descriptors: (*Propellers (Marine), Shrouded propellers), (*Shrouded propellers, Hydrodynamics), (*Submarines, Propellers (Marine)), Propeller blades, Propulsion, Graphics, Propeller hubs, Netherlands.

The supplement contains the reduced data of the experiments which are carried out in order to yield data with respect to the hydrodynamic properties of the shrouded aft propeller of the T.P.S. under static conditions. The forward propeller was fixed with the blades in feathering position. The dimensionless forces and moments on the model with the operating aft propeller, corrected for the forces and moments on the body without propeller blades and shroud are defined.

AD-608 197 Div. 31, 9
OTS Prices: HC $3.00/MF $0.75

Netherlands Ship Model Basin, Wageningen.
EXPERIMENTAL AND THEORETICAL RESEARCH ON THE HYDRODYNAMIC CHARACTERISTICS OF LARGE HUB TO DIAMETER RATIO PROPELLERS, SUPPLEMENT NO. 3.
Final technical rept., suppl. 3.
1964, 69p
Contract N62558 3463

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 194.

Descriptors: (*Propellers (Marine), Hydrodynamics), (*Submarines, Propellers (Marine)), Propeller blades, Propeller hubs, Force (Mechanics), Propulsion, Models (Simulations), Moments, Graphics, Netherlands.

The supplement contains the reduced data of the experiments which are carried out in order to yield data with respect to the hydrodynamic properties of the aft propeller without shroud of the T.P.S. under static conditions. The forward propeller was fixed with the blades in feathering position. The dimensionless forces and moments on the model with the operating aft propeller, corrected for the forces and moments on the body without propeller blades and shroud are defined.

AD-608 198 Div. 31, 9
OTS Prices: HC $3.00/MF $0.75

Netherlands Ship Model Basin, Wageningen.
EXPERIMENTAL AND THEORETICAL RESEARCH ON THE HYDRODYNAMIC CHARACTERISTICS OF LARGE HUB TO DIAMETER RATIO PROPELLERS, SUPPLEMENT NO. 4.
Final technical rept., suppl. 4.
1964, 64p
Contract N62558 3463

Unclassified report

See also AD-608 194.

Descriptors: (*Propellers (Marine), Hydrodynamics), (*Submarines, Propellers (Marines)), Propeller blades, Propeller hubs, Force (Mechanics), Moments, Graphics, Propulsion, Netherlands.

The supplement contains the reduced data of the experiments which are carried out in order to yield data with respect to the hydrodynamic properties of the forward propeller without shroud of the T. P. S. under static conditions. The aft propeller was fixed with the blades in feathering position. The dimensionless forces and moments on the model with the operating forward propeller, corrected for the forces and moments on the body without propeller blades and shroud are defined.

AD-608 199 Div. 31, 9
OTS Prices: HC $3.00/MF $0.50

Netherlands Ship Model Basin, Wageningen.
EXPERIMENTAL AND THEORETICAL RESEARCH ON THE HYDRODYNAMIC CHARACTERISTICS OF LARGE HUB TO DIAMETER RATIO PROPELLERS, SUPPLEMENT NO. 5.
Final technical rept., suppl. 5.
1964, 56p
Contract N62558 3463

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 194.

Descriptors: (*Propellers (Marine), Shrouded propellers), (*Shrouded propellers, Hydrodynamics), (*Submarines, Propellers (Marine)), Propeller blades, Propeller hubs, Force (Mechanics), Moments, Graphics, Models (Simulations), Netherlands.

The supplement contains the reduced data of the experiments which are carried out in order to yield data with respect to the hydrodynamic properties of the shrouded forward propeller of the T. P. S. under static conditions. The aft propeller was fixed with the blades in feathering position. The dimensionless forces and moments on the model with the operating forward propeller, corrected for the forces and moments on the body without propeller blades and shroud are defined.

32. Miscellaneous Arts and Sciences

AD-608 034 Div. 32
OTS Prices: HC $3.00/MF $0.75

Colorado Univ., Boulder.
CLASSIFICATION SPACE ANALYSIS.
Final rept.,
by Peter G. Assorio. Oct 64, 100p
Contracts AF30 602 3342, AF30 602 2992, Proj. 4594, Task 459401
RADC TDR64 287
Unclassified report

Descriptors: (*Information retrieval, Classification), (*Classification, Information retrieval), (*Subject indexing, Information retrieval), Indexes, Storage, Libraries, Reports, Records, Documentation, Vocabulary, Data processing systems, Automatic.

A conceptual approach to linguistic data processing problems is sketched and empirical illustrations are presented of the major software components - indexing, storage, and retrieval - of a document processing system which offers, in principle, the advantages of complete automation, unlimited cross-indexing, effective sequential retrieval, subdocumentary indexing reflecting heterogeneity of subject matter within a document, and a procedure for automatically identifying retrieval requests which would be inadequately handled by the system. The indexing scheme, designated as a 'Classification Space' consists of a Euclidean model for mapping subject matter similarity within a given subject matter domain. A scheme of this kind is empirically derived for certain fields of Engineering and Chemistry. A set of five related empirical studies provide convincing evidence that when appropriate experimental procedures are followed a very stable C-Space for a given content domain can be constructed on a surprisingly small data base. Other empirical studies demonstrate specific computational procedures for effective automatic indexing of documents in a C-Space, using a relatively small system vocabulary. (Author)

AD-608 223 Div. 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
COMMUNIST PROSPECTS IN INDONESIA,
by Guy J. Pauker. Nov 64, 62p RM-4135-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Indonesia, Communism), (*Communism, Indonesia), (*Political science, Indonesia), Communists, Leadership, Government (Foreign), History, Economics, Social sciences, Armed forces (Foreign).

A number of experts believe that the Communist Party of Indonesia (PKI) has been 'emasculated' or 'domesticated' under the authoritarian regime established in 1959 by President Sukarno with the assistance of an erstwhile anti-Communist officer corps. This analysis, which comes to the opposite conclusion, is based on the author's accumulated experience of Indonesian affairs (gained in part during eight field trips since 1955) and on a careful examination of publicly available Indonesian sources. No attempt is made here to suggest policies for the United States which would reverse the current trend of Indonesian political developments or to cope otherwise with their possible consequences.

AD-608 315 Div. 32
OTS Prices: HC $5.00/MF $1.00

Rand Corp., Santa Monica, Calif.
WEST GERMAN TRADE UNIONS: THEIR DOMESTIC AND FOREIGN POLICIES,
by Otto Kirchheimer. 1 Apr 56, 168p RM-1673-RC
Unclassified report

Descriptors: (*Labor unions, West Germany), (*West Germany, Labor unions), (*Foreign policy, West Germany), Political science, Economics, Social sciences, Government (Foreign), Communism, History, Industries, Wages, Industrial relations, Personnel, Attitudes, Aramament.

German unions, though numerically strong and presently operating under favorable conditions, are facing a number of handicaps. They suffer from a lack of dynamic leadership, and are weighted down by the burdens of the German political past. Both German tradition and present power configurations serve to make the unions insecure about their place in the present governmental setup. Consequently, they try to operate both as representatives of labor in the context of present-day capitalist institutions, and as a force seeking to add economic to political democracy. They consider labor as the only true custodian of democracy, and they mistrust both the state apparatus and their industrial opposite numbers. Their relations with both suffer from the fact that, in Germany, political notions evolving around the state as a repressive authority never yielded to concepts of the state as a dynamic expression of community life with ample latitude for divergent political and social forces.

AD-608 377 Div. 32
OTS Prices: HC $1.00/MF $0.50

Electronic Properties Information Center, Culver City, Calif.
ROLE OF THE TECHNICAL LIBRARY IN SUPPORT OF AN INFORMATION CENTER,
by Masse Bloomfield. Nov 64, 22p EPIC-S-5
Contract AF33 615 1235, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Libraries, Data processing systems), (*Information retrieval, Libraries), Data, Sources, Documentation, Indexes, Reports, Subject indexing, Abstracting, Analysis.

The information center is defined as that organization which acquires, stores, indexes, analyzes and synthesizes data and information. The library acquires, indexes, stores and disseminates documents and information. The information center's major product appears in reports which have evaluated, analyzed, integrated and synthesised the data of a special scientific topic and presented it in graphic or tabular form. The library supports the activities of the information center by providing for its acquisitions. The library can also provide assistance to the information center through its familiarity with information retrieval principles. The information center can rely on the library to provide it with indexing and abstracting tools which provide a means of access to related information. The library also supports the information center with its current awareness announcement bulletins. (Author)

AD-608 388 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TECHNICAL PROGRESS IN THE CAPITAL GOODS AND CONSUMER GOODS SECTORS OF THE UNITED STATES,
by Vincent D. Taylor. Nov 64, 26p P-3012
Unclassified report

Descriptors: (*Economics, United States),

Mathematical models, Industrial production, Labor, Wages, Distribution (Economics), Consumption, Money, History, Equations, Theory, Statistical analysis.

A considerable number of recent papers have appeared on the subject of two-sector growth models, examining many of the questions of interest in the fields of capital theory and growth; however, the emphasis has been on deriving general propositions about growth rates and stability, the influence of technical progress, relative price changes, and savings behavior. Almost no attempt has been made to fit these models to actual data. In this paper a means of overcoming this difficulty is suggested. The approach is to use completely aggregated data for the inputs, allocating the total factor supplies between sectors so that marginal efficiency conditions are satisfied. The only sectoral data required are ratios of gross investment to GNP and ratios of consumer goods prices to capital goods prices. Estimates of the historical course of technical progress in the consumer and capital goods sectors of the United States during the period 1929-1955 are also provided. The estimates are based on a simple two-sector model in which technical advances are shared by all existing machines.

AD-608 404 Div. 32, 30
OTS Prices: HC $6.00/MF $1.25

Naval Ordnance Lab., White Oak, Md.
DESCRIPTORS AND COMPUTER CODES USED IN NAVAL ORDNANCE LABORATORY LIBRARY RETRIEVAL PROGRAM,
by Eva Liberman. Dec 64, 228p
NOL TR64 20

Unclassified report

Descriptors: (*Libraries, Naval research laboratories), (*Subject indexing, Programming (Computers)), (*Naval ordnance, Information retrieval), Documentation.

The descriptors and computer codes are listed separately by subject, equipment designations (including acronyms, trade names, code names, etc.) and corporate authors, personal names, and geographic place names. These descriptors have been developed over a four-year period. They provide a subject approach to technical reports literature for use with IBM 7090 Computer. These descriptors conform to the areas of Laboratory interest in research, development, test, and evaluation in ordnance and related fields. (Author)

33. Transportation

AD-608 085 Div. 33, 1, 19
OTS Prices: HC $4.00/MF $0.75

Federal Aviation Agency, Washington, D. C.
AIRPORT SURFACE DETECTION EQUIPMENT (ASDE) OPERATIONAL EFFECTIVENESS WITH AND WITHOUT BRIGHT DISPLAY.
Final rept.,
by Stanley H. Gaffen. Oct 64, 102p
Proj. 141 411 03A
FAA RD64 141

Unclassified report

Descriptors: (*Air traffic control systems, Taxiing), (*Radar equipment, Display systems), Traffic, Airports, Surface area, Visibility, Brightness, All weather aviation, Air traffic control terminal areas, Terminal flight facilities.

Airport Surface Detection Equipment (ASDE) radar provides controllers with a means to observe surface traffic movement. In extremely low visibility controllers can't see all of a field. ASDE can then increase safety and help expedite traffic flow. The kinds of accidents which ASDE can help prevent have not occurred. For important types of runway combinations, its contribution to expediting flow appears to be very small, except where intersecting runways are used. As minimums are lowered and low visibility flow rates increase, ASDE's contribution to safety and expediting flow will also increase. Major recommendations are: bright-daylight ASDE displays should not be developed and installed unless ASDE will remain in tower cabs for a long time; plans to survey (dispose of) some ASDE's suggests this is unlikely. Bright ASR displays should be provided for tower cabs before bright ASDE displays. Consideration should be given to turning off some ASDE's and maintaining them in a moth-ball status. (Author)

AD-608 393 Div. 33, 8
OTS Prices: HC $3.00/MF $0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF CLOSED-CIRCUIT TELEVISION FOR AIRPORT BLIND-SPOT SURVEILLANCE.
Final rept.
by Leonard C. Moore and Robert W. Delaney.
Sep 64, 86p
Proj. 110 301 01V
FAA RD64 133

Unclassified report

Descriptors: (*Air traffic terminal areas, Television communication systems), (*Television communication systems, Air traffic control terminal areas), Airport control towers, Television equipment, Terminal flight facilities, Air traffic control systems, Performance (Engineering), Television cameras, Television display systems.

An evaluation of closed-circuit television was conducted at the Municipal Airport No. 1, Salt Lake City, Utah, to determine the operational capabilities and limitations of the system when used for the surveillance of critical portions of airport operating areas which could not be observed directly by airport traffic controllers. Meteorological conditions over a broad portion of the airport offered an extensive 'blind area' within which operating control points were treated separately as well-defined 'blind spots' of limited size. Lightweight single-engine aircraft were observed throughout the test program. The closed-circuit television system included two cameras, remotely operated from the Airport Traffic Control Tower Cab. It was concluded that closed-circuit television can provide pictorial information suitable for blind-spot surveillance of critical areas not directly visible from the Control Tower Cab of the airport. The principal operational limitations resulted from (a) the need to maintain a stationary frame of reference, both day and night, and (b) the absence of depth perception. It was recommended that closed-circuit television be considered acceptable for surveillance of critical portions of airport operating areas with each installation tailored to the specific local problem. (Author)

CORPORATE AUTHOR - MONITORING AGENCY INDEX

•ADAPTRONICS INC ALEXANDRIA VA
• • •
STUDY OF NEUROTRON NETWORKS IN LEARNING AUTOMATA. VOLUME I: LEARNING AUTOMATA AND HE NEUROTRON.
AD-608 306 DIV• 30
• • •
STUDY OF NEUROTRON NETWORKS IN LEARNING AUTOMATA. VOLUME II: COMPUTER SIMULATION.
AD-608 307 DIV• 30

•AEROELASTIC AND STRUCTURES RESEARCH LAB MASS INST OF TECH CAMBRIDGE
• • •
ASRL TR 106 3
VARIATION OF ELASTIC MODULI.
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LABORATORY FOR ELECTROSCIENCE RESEARCH NEW YORK UNIV N Y
NYU TR 400 98
(AFCRL 64 766)
AD-608 326 DIV. 8

•AF19 628 4014
IONOSPHERE RESEARCH LAB PENNSYLVANIA STATE UNIV UNIVERSITY PARK
IRL 215
(AFCRL 64 636)
AD-608 102 DIV. 25

•AF19 628 416
HOUSTON FEARLESS CORP LOS ANGELES CALIF
HFC R 130 64
(ESD TDR64 121)
F AD-608 277 DIV. 24

•AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
LL TR 365
(ESD TDR64 378)
AD-608 272 DIV. 30
LL 1964 63
(ESD TDR64 566)
AD-608 288 DIV. 8
LL 1964 57
(ESD TDR64 565)
AD-608 289 DIV. 30

•AF29 601 4601
AERDELASTIC AND STRUCTURES RESEARCH LAB MASS INST F TECH CAMBRIDGE
ASRL TR 106 3
(NL TR64 103)
AD-608 378 DIV. 25

•AF29 601 5221
TRACERLAB INC RICHMOND CALIF
TLR 1092
(NL TDR64 68)
F AD-608 123 DIV. 21

•AF29 601 6106
GENERAL ATOMIC DIV22 GENERAL DYNAMICS CORP SAN DIEGO CALIF
(NL TDR64 89)
F AD-608 271 DIV. 2

•AF30 602 1579
PHYSICAL RESEARCH LABS BOSTON UNIV MASS
AD-608 014 DIV. 6

•AF30 602 2717
APPLIED PSYCHOLOGY CORP ARLINGTON VA
(RADC TDR63 313)
F AD-608 219 DIV. 28

•AF30 602 2831
GENERAL DYNAMICS/FORT WORTH TEX
FZE 222 7
(RADC TDR64 397)
F AD-608 429 DIV. 6

•AF30 602 2831
GENERAL DYNAMICS/FORT WORTH TEX
FZE 222 6
(RADC TDR64 381)
F AD-608 252 DIV. 30

•AF30 602 2957
SYLVANIA ELECTRIC PRODUCTS INC BUFFALO N Y
(RADC TDR64 157)
F AD-608 141 DIV. 5

•AF30 602 2972
DELCO RADIO DIV GENERAL MOTORS CORP KOKOMO IND
(RADC TDR64 311)
F AD-608 137 DIV. 25

•AF30 602 2987
HUGHES AIRCRAFT CO FULLERTON CALIF
HAC FR 64 15 59
(RADC TDR64 356)
F AD-608 361 DIV. 8

•AF30 602 2992
COLORADO UNIV BOULDER
(RADC TDR64 287)
F AD-608 039 DIV. 32

•AF30 602 3016
SHOCKLEY TRANSISTOR DIV CLEVITE TRANSISTOR PALO ALTO CALIF

(RADC TDR64 361)
AD-608 496 DIV. 8

•AF30 602 3018
GENERAL TELEPHONE AND ELECTRONICS LABS INC BAYSIDE N Y
GTEL TR64 256.12
(RADC TDR64 290)
F AD-608 362 DIV. 8

•AF30 602 3027
HONEYWELL INC BOSTON MASS
(RADC TDR64 183)
F AD-608 140 DIV. 8

•AF30 602 3054
IIT RESEARCH INST CHICAGO ILL
IITRI E6006 11
(RADC TDR64 309)
F AD-608 365 DIV. 8

•AF30 602 3061
RCA DEFENSE ELECTRONIC PRODUCTS CAMDEN N J
(RADC TDR64 403)
F AD-608 218 DIV. 8

•AF30 602 3128
AERONCA MFG CORP MIDDLETON OHIO
(RADC TDR64 363)
F AD-608 473 DIV. 8

•AF30 602 3170
TECHNICAL RESEARCH GROUP EAST BOSTON MASS
(RADC TDR64 286)
F AD-608 363 DIV. 8

•AF30 602 3249
RAYTHEON CO WALTHAM MASS
(RADC TDR64 285)
AD-608 037 DIV. 8

•AF30 602 3261
WATKINS-JOHNSON CO PALO ALTO CALIF
(RADC TDR64 411)
AD-608 221 DIV. 8

•AF30 602 3329
SPERRY GYROSCOPE CO GREAT NECK N Y
AB 1272 0016 1
(RADC TDR64 319)
AD-608 220 DIV. 25

•AF30 602 3339
HUGHES AIRCRAFT CO WASHINGTON D C TECHNICAL ANALYSIS OFFICE
TAO 64 1
(RADC TDR64 274)
AD-608 036 DIV. 15

•AF30 602 3342
COLORADO UNIV BOULDER
(RADC TDR64 287)
F AD-608 039 DIV. 32

•AF30 602 3371
LIBRASCOPE DIV GENERAL PRECISION INC GLENDALE CALIF
(RADC TDR64 437)
AD-608 427 DIV. 30

•AF30 602 3425
SCIENTIFIC-ATLANTA INC ATLANTA GA
(RADC TDR64 420)
AD-608 475 DIV. 8

•AF33 600 42523
WESTERN GEAR CORP LYNWOOD CALIF
WGC 647 226
(AMC TR7 866 VII)
AD-608 319 DIV. 26

•AF33 615 1039
UNITED NUCLEAR CORP WHITE PLAINS N Y
UNC 5087
(APL TDR64 93)
AD-608 042 DIV. 4

•AF33 615 1070
AUTONETICS ANAHEIM CALIF
(APL TDR64 123)
AD-608 176 DIV. 8

•AF33 615 1121
DEFENSE METALS INFORMATION CENTER COLUMBUS OHIO
AD-608 110 DIV. 17
DMIC 206
AD-608 142 DIV. 17

•AF33 615 1185
ALLIS-CHALMERS MFG CO MILWAUKEE WIS
AD-608 239 DIV. 7

•AF33 615 1227
CLEVITE CORP CLEVELAND OHIO
(AL TDR64 265)
AD-608 324 DIV. 25

•AF33 615 1235
ELECTRONIC PROPERTIES INFORMATION CENTER CULVER CITY CALIF
EPIC S 5
AD-608 377 DIV. 32
DS 141
AD-608 398 DIV. 17

•AF33 615 1271
WESTINGHOUSE ELECTRIC CORP ELMIRA NY
AD-608 113 DIV. 8

•AF33 615 1341
NORAIR DIV NORTHROP CORP HAWTHORNE CALIF
NOR 64 278
AD-608 290 DIV. 26

•AF33 615 1351
AIRESEARCH MFG CO LOS ANGELES CALIF
(APL TDR64 115)
AD-608 079 DIV. 21

•AF33 615 1374
DYNATECH CORP CAMBRIDGE MASS
DYNATECH 485
AD-608 250 DIV. 25

•AF33 615 1382
REPUBLIC AVIATION CORP FARMINGDALE N Y
RAC 1932 2
AD-608 227 DIV. 1

•AF33 615 1931
SPERRY GYROSCOPE CO GREAT NECK N Y
AB 1272 0028 1
AD-608 276 DIV. 30

•AF33 616 8005
OHIO STATE UNIV COLUMBUS
(ML TDR64 272)
AD-608 103 DIV. 14

•AF33 616 8050
WILKES COLL WILKES-BARRE PA
(ARL 64 160)
F AD-608 449 DIV. 25

•AF33 616 8121
MICROWAVE LAB STANFORD UNIV CALIF
(ARL 64 137)
AD-608 440 DIV. 2

•AF33 616 8130
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y
(FDL TDR64 199)
AD-608 040 DIV. 9
(FDL TDR64 10)
AD-608 304 DIV. 9
(FDL TDR64 2 P2)
AD-608 441 DIV. 9

•AF33 616 8261
PHILCO RESEARCH LABS NEWPORT BEACH CALIF
(AL TR64 274)
AD-608 418 DIV. 24

•AF33 616 8310
MINNESOTA UNIV MINNEAPOLIS
(ASD TDR63 663)
AD-608 303 DIV. 9
(ASD TDR63 662)
AD-608 305 DIV. 1

•AF33 616 8399
CALIFORNIA INST OF TECH PASADENA
GALCIT SM 64 6
(ARL 64 144)
AD-608 447 DIV. 14

•AF33 657 10474
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF ILLINOIS URBANA
AD-608 261 DIV. 8

ILLINOIS UNIV URBANA ENGIN EERING EXPERIMENT STATION
AD-608 320 DIV. 8

•AF33 657 10475
MINNESOTA UNIV MINNEAPOLIS PHYSICAL ELECTRONICS RESEARCH LAB
AD-608 149 DIV. 25

•AF33 657 10734
ADAPTRONICS INC ALEXANDRIA VA
F AD-608 306 DIV. 30
F AD-608 307 DIV. 30

•AF33 657 10763
LABORATORY OF AVIATION PSYCHOLOGY OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
(AMRL TR64 95)
F AD-608 108 DIV. 18

•AF33 657 10844
OHIO STATE UNIV COLUMBUS RESEARCH FOUNDATION
(ML TDR64 176)
AD-608 041 DIV. 17

•AF33 657 11046
MELPAR INC FALLS CHURCH VA
(APL TR64 127)
F AD-608 471 DIV. 7

•AF33 657 11183
AEROJET-GENERAL NUCLEONICS SAN RAMON CALIF
AN 1259
(APL TDR64 124 V1)
A AD-608 379 DIV. 25

•AF33 657 11219
PITTSBURGH PLATE GLASS CO PA
(ML TDR64 180)
F AD-608 125 DIV. 30

•AF33 657 11228
MRO DIV GENERAL AMERICAN TRANS PORTATION CORP NILES ILL
(ML TDR64 278)
AD-608 072 DIV. 26

•AF33 657 11253
UNION CARBIDE CORP PARMA OHIO
(ML TDR64 173 P2)
S AD-608 092 DIV. 14

•AF33 657 11320
PRATT AND WHITNEY AIRCRAFT EAST HARTFORD CONN
PWA 2369
(APL TDR64 121)
AD-608 061 DIV. 7

•AF33 657 11345
GENERAL ELECTRIC CO PHILADELPHIA PA
(AMRL TDR64 60)
F AD-608 088 DIV. 16

•AF33 657 11394
AEROJET-GENERAL CORP SACRAMENTO CALIF
(FDL TDR64 69)
F AD-608 472 DIV. 30

•AF33 657 11395
KORAD CORP SANTA MONICA CALIF
(AL TDR64 195 P1)
F AD-608 105 DIV. 14

•AF33 657 11510
POLACOAT INC BLUE ASH OHIO
(AL TDR64 170)
AD-608 426 DIV. 30

•AF33 657 11629
WESTINGHOUSE ELECTRIC CORP BALTIMORE MD
WESTING 1712A

(FDL TDR64 101)
F AD-608 428 DIV. 19

•AF33 657 11686
LINDE DIV UNION CARBIDE CORP
TONAWANDA N Y
(AMRL TDR64 76)
F AD-608 260 DIV. 10

•AF33 657 12388
AEROJET-GENERAL NUCLEONICS
SAN RAMON CALIF
AN 1255
(APL TDR64 124 V1)
A AD-608 379 DIV. 25

•AF33 657 7486
BELL AEROSYSTEMS CO BUFFALO
N Y
AD-608 469 DIV. 9
(FDL TDR64 16 P2)
AD-608 476 DIV. 9

•AF33 657 7690
IIT RESEARCH INST CHICAGO
ILL
IITRI 8233
(ARL 63 245 P2)
AD-608 450 DIV. 17

•AF33 657 7867
GEORGIA INST OF TECH ATLANTA
ENGINEERING EXPERIMENT STATION
(AL TDR64 103)
F AD-608 228 DIV. 25

•AF33 657 7916
HARSHAW CHEMICAL CO CLEVELAND
OHIO
(ARL 64 142)
AD-608 468 DIV. 7

•AF33 657 8025
UNION CARBIDE CORP PARMA OHIO
(WADD TDR60 143)
AD-608 301 DIV. 14

•AF33 657 8298
SPACE SCIENCES LAB GENERAL
ELECTRIC CO PHILADELPHIA
PA
R64SD70
AD-608 093 DIV. 25

•AF33 657 8677
MICROWAVE DEVICE AND PHYSICAL
ELECTRONICS LAB UNIV OF
UTAH SALT LAKE CITY
ASD 3
(AL TDR64 225)
AD-608 214 DIV. 8

•AF33 657 8741
OHIO STATE UNIV COLUMBUS
RESEARCH FOUNDATION
(ML TDR64 300)
AD-608 073 DIV. 25

•AF33 657 8951
ROCKET RESEARCH LAB OHIO STATE
UNIV COLUMBUS
(ARL 64 143)
AD-608 467 DIV. 4

•AF33 657 9078
WESTINGHOUSE RESEARCH CENTER
PITTSBURGH PA
AD-608 000 DIV. 14
AD-608 002 DIV. 14

•AF33 657 9168
MSA RESEARCH CORP CALLERY
PA
(ML TR64 227)
AD-608 385 DIV. 17

•AF33 657 9216
SPECTROLAB SYLMAR CALIF
(AL TDR64 268)
AD-608 064 DIV. 25

•AF33 657 9660
OHIO STATE UNIV COLUMBUS
RESEARCH FOUNDATION
(AMRL TR64 80)
F AD-608 284 DIV. 30

•AF33 657 9681
AMERICAN OPTICAL CO SOUTHBRIDGE
MASS
(SEG TDR64 90)
F AD-608 299 DIV. 25

•AF41 657 343
AMERICAN FOUNDATION FOR BIOLOGICAL
RESEARCH MADISON WIS
(AAL TDR63 26)
AD-608 211 DIV. 16

•AF41 657 417
ALBERT EINSTEIN MEDICAL CENTER
PHILADELPHIA PA
(AAL TDR64 4)
AD-608 212 DIV. 16

•AF49 638 1271
GAS DYNAMICS LAB PRINCETON
UNIV N J
AER 701
(AFOSR 64 1596)
AD-608 208 DIV. 9

•AF49 638 1276
STANFORD UNIV CALIF
SUDAER 205
(AFOSR 64 1724)
AD-608 203 DIV. 25
SUDAER 204
(AFOSR 64 1725)
AD-608 204 DIV. 25
SUDAER 201
(AFOSR 64 1726)
AD-608 205 DIV. 25

•AF49 638 1389
HIGH ENERGY PHYSICS LAB STANFORD
UNIV CALIF
ITP 141
AD-608 136 DIV. 20

•AF49 638 352
STEVENS INST OF TECH HOBOKEN
N J
SIT P6515/62
(AFOSR 2588)
AD-608 395 DIV. 25

•AF49 638 354
DUKE UNIV DURHAM N C SCHOOL
OF MEDICINE
(AFOSR 1515)
A AD-608 402 DIV. 28

•AF49 638 382
RIAS INC BALTIMORE MD
RIAS TR 62 10
(AFSOR 2501)
AD-608 403 DIV. 30

•AF49 638 385
INSTITUTE FOR FLUID DYNAMICS
AND APPLIED MATHEMATICS
UNIV OF MARYLAND COLLEGE
(AFOSR 211)
F AD-608 405 DIV. 9

•AF49 638 530
MARYLAND UNIV COLLEGE PARK
(AFOSR TN60 747)
AD-608 068 DIV. 2

•AF49 638 659
AVCO-EVERETT RESEARCH LAB
EVERETT MASS
AVCO RR 189
AD-608 147 DIV. 30

•AF49 638 700
RAND CORP SANTA MONICA CALIF
RM 4342 PR
AD-608 060 DIV. 15
RM 4269 PR
AD-608 270 DIV. 15
RM 4334 PR
AD-608 287 DIV. 15
RM1863 1
AD-608 316 DIV. 12

•AF49 638 914
SPACE SCIENCES LAB GENERAL
ELECTRIC CO PHILADELPHIA
PA
R64SD70
AD-608 093 DIV. 25

•AF61 052 366
TECHNISCHE HOCHSCHULE DARMSTADT
(WEST GERMANY)
(AFCRL 64 867)
F AD-608 442 DIV. 2

•AF61 052 619
KIRUNA GEOPHYSICAL OBSERVATORY
(SWEDEN)
(AFCRL 64 866)
AD-608 477 DIV. 2

•AF61 052 623
IONOSPHAREN-INSTITUT BREISACH
(WEST GERMANY)
IIB 12
(AFCRL 64 900)
AD-608 479 DIV. 2

•AF61 052 664
WALES UNIV CARDIFF
(AFCRL 64 828)
AD-608 454 DIV. 25

•ARDS994
ROLLAY (E) ASSOCIATES INC
GOLETA CALIF
(FAA RD64 136)
F AD-608 374 DIV. 30

•ARPA AMC62G2
CHARGED PARTICLE RESEARCH
LAB UNIV OF ILLINOIS URBANA
CPRL 8 64
AD-608 382 DIV. 25

•AT11 1 614 GRANT
CHICAGO UNIV ILL
AD-608 157 DIV. 30

•AT30 1 1842
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
AD-608 280 DIV. 30

•AT49 7 2425
NAVAL RESEARCH LAB WASHINGTON
D C
6165
AD-608 209 DIV. 20

•CWR10704
TRAVELERS RESEARCH CENTER
INC HARTFORD CONN
AD-608 101 DIV. 2

•DA ARO D31 124G134
MARYLAND UNIV COLLEGE PARK
(AROD 407 67)
F AD-608 224 DIV. 15

•DA ARO D31 124G310
SOUTH CAROLINA UNIV COLUMBIA
(AROD 3099 4)
F AD-608 063 DIV. 15

•DA ARO D31 124G65
WASHINGTON UNIV ST LOUIS MO
(AROD 2791 5)
AD-608 392 DIV. 20

•DA CML18 108G51
CALIFORNIA UNIV LOS ANGELES
(AMRL TDR64 72)
F AD-608 089 DIV. 16

•DA01 0090RD991
NORTH CAROLINA STATE COLL
RALEIGH SCHOOL OF ENGINEERING
AD-608 311 DIV. 25
AD-608 312 DIV. 25

•DA11 070 SOBORD1232
IOWA STATE UNIV IOWA CITY
AD-608 262 DIV. 12

•DA18 035AMC123A
WESTINGHOUSE ELECTRIC CORP
BALTIMORE MD
AD-608 200 DIV. 3

•DA30 069ORD3743
TITANIUM METALS CORP OF AMERICA
NEW YORK
(WAL TR405 2 6)
AD-608 281 DIV. 17

•DA30 347ENG284
ALCO PRODUCTS INC SCHENECTADY
N Y
APAE M 203
AD-608 317 DIV. 20
APAE M 201
AD-608 318 DIV. 20
APAE M 202
AD-608 319 DIV. 20

•DA31 124ARO D173
DELAWARE UNIV NEWARK
(AROD 4461 1)
AD-608 273 DIV. 25

•DA36 034ORD3514RD
RIAS INC BALTIMORE MD
RIAS TR 62 10
(AFSOR 2501)
AD-608 403 DIV. 30

•DA36 039AMC01471E
CLEVITE CORP BEDFORD OHIO
AD-608 465 DIV. 6

•DA36 039AMC03200E
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
AD-608 280 DIV. 20

•DA36 039AMC03619E
GENERAL ELECTRIC CO AUBURN
N Y
AD-608 240 DIV. 8

•DA36 039AMC03624E
LINDE DIV UNION CARBIDE CORP
CLEVELAND OHIO
AD-608 097 DIV. 8

•DA36 039SC73974
KNIGHTS (JAMES) CO SANDWICH
ILL
AD-608 313 DIV. 8

•DA36 039SC86738
GENERAL ELECTRIC CO OWENSBORO
KY
F AD-608 401 DIV. 8

•DA36 039SC86741
AEROPROJECTS INC WEST CHESTER
PA
AD-608 177 DIV. 8

•DA36 039SC86742
TRW SEMICONDUCTORS INC LAWNDALE
CALIF
TRWS 3000 43 VOL. 1
F AD-608 371 DIV. 8
TRWS 3000 43 VOL. 3
F AD-608 373 DIV. 8

•DA36 039SC90789
COLUMBIA RADIATION LAB NEW
YORK
CU 9 64 SC 90789
AD-608 160 DIV. 25

•DA36 061ORD947
CARNEGIE INST OF TECH PITTSBURGH
PA
(AROD 1280 13)
F AD-608 338 DIV. 26

•DA44 177AMC48T
DYNASCIENCES CORP FORT WASHINGTON
PA
DCR 137
(TRECOM TR64 47)
AD-608 186 DIV. 1

•DA44 177AMC65T
DYNASCIENCES CORP FORT WASHINGTON
PA
DCR 139
(TRECOM TR64 48)
AD-608 185 DIV. 1

•DA44 177AMC88T
AVIATION SAFETY ENGINEERING
AND RESEARCH PHOENIX ARIZ
AVSER 62 27
(TRECOM TR63 81SUPPL•)
AD-608 189 DIV. 1
AVSER 62 27
(TRECOM TR63 81)
AD-608 192 DIV. 1

•DA44 177AMC89ZT
MISSISSIPPI STATE UNIV STATE
COLLEGE
(TRECOM TR64 91)
AD-608 187 DIV. 1

•FA WA4949
SPERRY GYROSCOPE CO GREAT
NECK N Y
HB 9202 0074
(FAA RD64 71)
F AD-608 394 DIV. 1

•FA WA4656
SPERRY MICROWAVE ELECTRONICS
CO CLEARWATER FLA
F AD-608 100 DIV. 19

•FA WA4697
BURROUGHS CORP PAOLI PA
(FAA RD64 124)
F AD-608 084 DIV. 6

•FAA BRD401
HUMAN SCIENCES RESEARCH INC
MCLEAN VA
HSR RR 64/2 MKX
(FAA RD64 94)
F AD-608 049 DIV. 1
HSR RR 64/7 MKX
(FAA RD64 93)
F AD-608 050 DIV. 1

•GRANT NSF-GP444
WISCONSIN UNIV MADISON
AD-608 150 DIV. 2

•GRANT PHS MH00743 08
WASHINGTON UNIV SEATTLE
AD-608 424 DIV. 28

•GRANT PHS11072 01
GATES AND CRELLIN LABS OF
CHEMISTRY CALIF INST OF
TECH PASADENA
AD-608 244 DIV. 4

•IPR19 64 8026WEPS
BUREAU OF MINES PITTSBURGH
PA
AD-608 251 DIV. 22

•NAS8 5289
BROWN ENGINEERING CO INC HUNTSVILLE
ALA
BROWNENG R 109
AD-608 359 DIV. 13

•NBY93160
FRITZ ENGINEERING LAB LEHIGH
UNIV BETHLEHEM PA
FRITZ 205.4
F AD-608 423 DIV. 13

•NIH GM09608 03
RAND CORP SANTA MONICA CALIF
P 3005
AD-608 399 DIV. 16

•NONR58243
ILLINOIS UNIV URBANA ENGINEERING
EXPERIMENT STATION
RRL 262
AD-608 321 DIV. 8

•NONR87291
MICROWAVE ASSOCIATES INC BURLINGTON
MASS
F AD-608 322 DIV. 8

•NONR89229
ILLINOIS UNIV URBANA ENGINEERING
EXPERIMENT STATION
RRL 262
AD-608 321 DIV. 8

•NONR89462
MICROWAVE ASSOCIATES INC BURLINGTON
MASS
AD-608 054 DIV. 8

•NONR89464
WOODS HOLE OCEANOGRAPHIC INSTI
TUTION MASS
WHOI REF 64 32
AD-608 397 DIV. 2

•NONR89530
WESTINGHOUSE ELECTRIC CORP
ELMIRA N Y
AD-608 130 DIV. 8

•NONR91322
MICROWAVE ELECTRONICS CORP
PALO ALTO CALIF
AD-608 413 DIV. 8

•NONR88607
IIT RESEARCH INST CHICAGO
ILL
IITRI K6056
F AD-608 168 DIV. 31

•NONR89440
AMERICAN MONARCH CORP MINNEAPOLIS
MINN
AD-608 172 DIV. 7

•NONR90041
FRITZ ENGINEERING LAB LEHIGH
UNIV BETHLEHEM PA
FRITZ 205.4
F AD-608 423 DIV. 13

•NONR90092
OLIN MATHIESON CHEMICAL CORP
NEW HAVEN CONN
F AD-608 144 DIV. 14

•NONR90194
GENERAL PRECISION INC LITTLE
FALLS N J
F AD-608 263 DIV. 4

•NONR G00014 64
LUNAR AND PLANETARY LAB UNIV
OF ARIZONA TUCSON
F AD-608 352 DIV. 2

•NONR G00034 64
WASHINGTON UNIV SEATTLE SCHOOL
OF MEDICINE
A AD-608 171 DIV. 16

•NONR1147 07
COLORADO UNIV BOULDER
AD-608 122 DIV. 28

•NONR1181 11
DUKE UNIV DURHAM N C
A AD-608 406 DIV. 28

•NONR1202 07
WISCONSIN UNIV MADISON
AD-608 150 DIV. 2
AD-608 151 DIV. 2

•NONR1202 16
GEOPHYSICAL AND POLAR RESEARCH
CENTER UNIV OF WISCONSIN
MADISON
GPRC RR 64 4
AD-608 132 DIV. 30

•NONR1224 22
COMMUNICATION SCIENCES LAB
UNIV OF MICHIGAN ANN ARBOR
CSL 11
AD-608 119 DIV. 5

•NONR1224 23
MICHIGAN UNIV ANN ARBOR COLL
OF LITERATURE SCIENCE AND
THE ARTS
ORA 03106 16 T
AD-608 457 DIV. 20

•NONR1228 10 GRANT
CARNEGIE INST OF TECH PITTSBURGH
PA GRADUATE SCHOOL OF INDUSTRIAL
ADMINISTRATION
ONR RM 133
AD-608 246 DIV. 26

•NONR1677 09
BRANDEIS UNIV WALTHAM MASS
AD-608 291 DIV. 20

•NONR1834 22
ELECTRICAL ENGINEERING RESEARCH
LAB UNIV OF ILLINOIS URBANA
AD-608 159 DIV. 2

•NONR1834 31
ILLINOIS UNIV URBANA AGRICULTURAL
EXPERIMENT STATION
AD-608 114 DIV. 24

•NONR1841 93
FLUID MECHANICS LAB MASS INST
OF TECH CAMBRIDGE
FML PUB 64 9
AD-608 430 DIV. 9
FML PUB 64 8
AD-608 431 DIV. 9

•NONR1858 12
PRINCETON UNIV N J
AD-608 435 DIV. 28

•NONR1866 02
HARVARD UNIV CAMBRIDGE MASS
DIV OF ENGINEERING AND APPLIED

PHYSICS
AD-608 264 DIV. 25

•NONR1866 16
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
CRUFT TR 452
AD-608 278 DIV. 25

•NONR1866 32
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
CRUFT TR 453
AD-608 282 DIV. 8
CRUFT TR 455
AD-608 283 DIV. 8

•NONR2168 03
CINCINNATI UNIV OHIO
AE 6401
AD-608 294 DIV. 9

•NONR220 26
GATES AND CRELLIN LABS OF CHEMISTRY CALIF INST OF TECH PASADENA
AD-608 245 DIV. 4

GATES AND CRELLIN LABS OF CHEMISTRY CALIF INST OF TECH PASADENA
AD-608 243 DIV. 4
AD-608 244 DIV. 4

•NONR222 45
INSTITUTE OF ENGINEERING RESEARCH UNIV OF CALIFORNIA BERKELEY
AS 64 15
AD-608 134 DIV. 9

•NONR225 37
STANFORD UNIV CALIF SCHOOL OF HUMANITIES AND SCIENCES
CS 12
AD-608 292 DIV. 15

•NONR233 87
CALIFORNIA UNIV LOS ANGELES
AD-608 331 DIV. 14

•NONR263 10
DAVIDSON LAB STEVENS INST OF TECH HOBOKEN N J
SIT DL 1023
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OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index.

1. Aircraft and Flight Equipment

Patent 3,139,721 Div. 1

CANOPY ACTUATOR AND EJECTOR DEVICE.
Air Force-assigned Patent.
by Richard P. Daubenspeck. 7 Jul 64,
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pneumatic servomechanisms), (*Aircraft canopies, Pneumatic servomechanisms), (*Pneumatic servomechanisms, Aircraft canopies), Pneumatic system, Jettisonable equipment.

The device is useful in connection with the movement of the canopy of an airplane. The device combines a power actuator for manipulating the canopy, a counterbalancing device having a self-contained charge of high pressure gas for counterbalancing the canopy of a grounded airplane, and a self-contained charge of high pressure gas for jettisoning the canopy from the airplane in flight.

Patent 3,139,751 Div. 1, 7

ALL WEATHER VORTEX FREE-AIR THERMOMETER.
Navy-assigned Patent.
by Paul Rosenthal and John W. Kurzrock. 7 Jul 64,
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Thermometers), (*Thermometers, Ice prevention), Heating elements, Aircraft.

The thermometer may be used on aircraft in icing conditions. Provision is made in a free-air thermometer of the vortex type to generate and to distribute heat in proper proportions to the external surfaces and to the interior passages of the thermometer to prevent ice build-up thereon and therein when the instrument is operated in icing conditions. Heat is supplied by electrical resistance elements.

Patent 3,140,605 Div. 1

AERODYNAMICALLY ALIGNED ACCELEROMETER.
Air Force-assigned Patent,
by George J. Randolph, Jr. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Accelerometers), (*Accelerometers, Alignment), Flight instruments, Installation, Airplane noses, Aircraft protuberances, Shafts.

The device is for acquiring aircraft flight acceleration data along the flight path of the aircraft in flight. The accelerometer aligning mechanism includes a vane directly coupled to an accelerometer by connecting rod or shaft. The accelerometer is mounted in the nose of the aircraft in such a manner as to position the axis of the rod perpendicular to the longitudinal axis of the aircraft and parallel to the lateral axis of the aircraft.

2. Astronomy, Geophysics and Geography

Patent 3,142,032 Div. 2, 8

INTERLACED VIDEO DISPLAY OF SEA BOTTOM USING SONIC ENERGY.
Navy-assigned Patent.
by Charles Howard Jones. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Television display systems), (*Television display systems, Ocean bottom topography), (*Ocean bottom topography, Television display systems), Sonar, Echo ranging, Sonar equipment, Television equipment.

Sonics are used to obtain a video image of the sea bottom from a ship that corresponds to the image that one would obtain if he could visually observe the sea bottom through a pipe directed toward the bottom and while the pipe was moved over a selected path over the sea bottom. The method is utilized for sea bottom strip mapping. The components include a transmitter, a receiver, a tape recording system, a video amplifier and a video display device. (Author)

PB-166 355 Div. 2, 30
OTS Prices: HC $2.00/MF $0.50

Weather Bureau, Washington, D. C.
LIGHTNING STROKE COUNTERS,
by Ferdinand H. Zegel. Aug 64, 50p MED-10
Unclassified report

Descriptors: (*Lightning, Counting methods), (*Meteorological instruments, Lightning), Infrared equipment, Thunderstorms.

A sensor for the detection of local thunderstorm activity was devised by the U. S. Weather Bureau as part of i.s AMOS automatic meteorological observation system. The counter counts electrical activity during a 1-minute period. When lightning stroke static is detected, the steady current in a vacuum tube is interrupted, a relay is de-energized, relay contacts are closed, and indicator lamp is lighted, an AC voltage appears on the coil of another relay in the indicator through a shielded connecting lead, and the latter relay becomes energized. The operation of this USWB-UF/FC-2C has had limited success. The Weather

Bureau is investigating the possibility of employing infrared techniques for such instruments. Details are given of the designs for counters studied by the World Meteorological organization, including the Swedish Ceraunometer and the 1957 UF/FC-2C of Sullivan and Wells.

PB-166 358 Div. 2, 20
OTS Prices: HC $1.00/MF $0.50

Weather Bureau, Washington, D. C.
AN ISOTOPE-POWERED AUTOMATIC WEATHER STATION,
by Francis V. Kohl. May 64, 20p IED-7
Unclassified report

Descriptors: (*Weather stations, Automatic), (*Nuclear power plants, Weather stations), (*Isotopes, Nuclear power plants), Weather forecasting, Buildings, Meteorological instruments, Telemeter systems, Power supplies, Arctic regions.

This article gives a brief history and description of the first isotope-powered automatic weather station. Some of the operational problems are discussed, and future plans for the station are indicated. (Author)

PB-166 359 Div. 2, 5, 24
OTS Prices: HC $2.00/MF $0.50

Weather Bureau, Washington, D. C.
WEATHER BUREAU AUTOMATIC PICTURE TRANSMISSION GROUND STATION ENGINEERING MODEL NO. 1,
by Robert R. Miller. May 64, 40p IED-6
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Meteorological satellites, Facsimile transmission), (*Facsimile transmission, Meteorological satellites), Weather stations, Facsimile equipment, Automatic, Antenna components, Control panels, Magnetic recording systems, Tracking, Clouds, Photographic analysis.

An engineering model of a meteorological satellite readout station providing real-time pictures of earth cloud-cover is described. General descriptions of both operational requirements and equipment are given with reference to pictorial diagrams. Operational evaluation indicates that the design approach is practicable. (Author)

PB-166 362 Div. 2
OTS Prices: HC $2.00/MF $0.50

Weather Bureau, Washington, D. C.
PRELIMINARY TEST REPORT ON WIND-DIRECTION VANE CHARACTERISTICS,
by Herman H. Crouser. Nov 63, 30p IED-3
Unclassified report

Descriptors: (*Wind-direction indicators, Test equipment), Wind, Velocity, Oscillation, Gas flow, Damping, Materials, Test methods, Equations.

Tests made on one standard and one experimental wind-direction vane are described. The oscillation frequency of these vanes varies with wind speed, while the wavelength of oscillation remains nearly constant. Tests indicate that the experimental vane has a response rate about three times that of the standard vane. This faster response rate is achieved by shortening the counterbalance arm. The tests also disclose that the vanes have undesirably light damping. A standard vane with better response characteristics is desirable. (Author)

PB-166 363 Div. 2
OTS Prices: HC $2.00/MF $0.50

Weather Bureau, Washington, D. C.
INFRARED ABSORPTION HYGROMETER,
by Wayne F. Staats, Laurence W. Foskett, and Hans P. Jensen. Oct 63, 46p IED-2
Unclassified report

Paper presented at the 1963 International Symposium on Humidity and Moisture held at Washington, D. C., May 20 through 23, 1963.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Meteorological instruments, Hygrometers), (*Hygrometers, Design), Humidity, Measurement, Infrared radiation, Absorption, Modulators, Servomechanisms, Photoelectric cells (Semiconductor), Optical filters, Calibration, Barometric pressure.

An optical hygrometer designed to measure the absolute humidity of the atmosphere by measuring the absorption effected in the 1.37-micron water-vapor-absorption band is described. Basically, the instrument comprises a 1-meter beam of radiant energy, a modulator, and a self-balancing serve system with detector photocell. Modulation and spectral isolation are obtained by means of an oscillating narrow-band interference filter. Through the use of this oscillating filter the energy in a spectral region of absorption is compared with that of a region of lesser absorption by changing the angle of incidence of the filter. A balance of energy is maintained in the two spectral regions by the servo system which automatically changes the lamp temperature and, hence, the energy distribution of the beam. Lamp temperature is monitored by a photocell, the output of which is an index of the water vapor. A calibration curve is given and the method of calibration is described. Moreover, preliminary calibration curves depicting the effect of pressure on the instrument are shown. Included is a brief discussion of stability and optimum design characteristics. (Author)

PB-166 367 Div. 2, 25, 30
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
RESULTS FROM AN ARTIFICIAL IRON METEOROID AT 10 km/sec.
Research note,
by Richard E. McCrosky and Robert K. Soberman.
Jul 62, 32p
ARPA Order13 61
AFCRL 62 803
Unclassified report

Subcontracted to Lincoln Lab., Mass. Inst. of Tech., Lexington, Contract AF19 604 7400.
Prepared in cooperation with Harvard Coll. Cambridge Mass. Observatory.

Descriptors: (*Meteorites, Simulation), (*Atmosphere entry, Meteorites), (*Pellets, Meteorites), Iron, Light, Hypervelocity projectiles, Upper atmosphere, Stainless steel, Optical tracking, Luminescence.

A type 304 stainless steel pellet of approximately 2.2 gm mass was propelled downward into the atmosphere from an altitude of about 190 km to produce an artificial meteor. The pellet was observed visually and photographically moving with an initial velocity of approximately 10 km/sec. The photographs were reduced by the standard precision method normally used for meteors. A value of approximately 8 x 10 to the minus nineteenth power (cgs and M sub pg) is obtained for the luminosity coefficient tau sub 0

of the pellet. Various corrections needed to convert this value to a luminosity coefficient valid for meteoric material are discussed.

PB-166 382 Div. 2, 8
OTS Prices: HC $2.00/MF $0.50

Weather Bureau, Washington, D. C.
TESTING GPG-1 GUN LAYING RADAR FOR WIND FINDING.
Final rept. (Revised ed.),
by Wm. Morrison, R. R. Miller, and R. M. Huley.
24 Oct 62, 38p IED-1
Unclassified report

Revision of 18 Sep 61 Report on Radar Research Project.

Descriptors: (*Meteorological radar, Wind-direction indicators), (*Wind-direction indicators, Radar equipment), (*Radar equipment, Meteorological radar), Balloons, Radar corner reflectors, Radar scanning, Fire control systems components, Fire control computers, Meteorological instruments, Compatibility, Maintainability, Feasibility studies.

With the availability of the GPG-1 fire control radar from Military excess, the Weather Bureau initiated the GPG Radar Research Project to fill a requirement for a wind-finding system of high accuracy, preferably automatic in operation, suitable for use under all atmospheric conditions, and for providing data at altitudes in excess of 50,000 feet. The following phases are included: (1) Evaluation of the GPG-1 radar in its original operating state for wind-finding purposes. (2) Modification and test of one GPG-1 radar for automatic tracking wind-finding purposes. (3) If Phase 2 yields promising results, to prepare a specification for a commercial modification contract.

3. Chemical Warfare Equipment and Materials

Patent 3,140,754 Div. 3

GAS MASK SPEECH TRANSMISSION.
Army-assigned Patent,
by Armard V. Motsinger. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective masks), (*Protective masks, Sound transmission), Protective mask facepieces, Diaphragms (Mechanics), Vibration, Resonance, Speech.

The voice transmitting device for gas masks is of the type disclosed in patent No. 2,974,665. The device of patent No. 2,974,665 included a vibratable diaphragm and a resonating chamber between the diaphragm and the mouth of the wearer. In the present disclosure the diaphragm is protected against puncture or other injury.

4. Chemistry

CAPE-1062 Div. 4

Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM FABRICATION PILOT PLANT EQUIPMENT.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Chemical engineering, Plutonium), (*Industrial equipment, Specifications), (*Plutonium, Chemistry), Laboratory equipment, Chemical industry.

This package contains 14 drawings. The equipment is used in plutonium chemistry and consists of a precipitator, drum filter, calciner, fluorinator, and glove box. (AEC abstract)

Patent 3,140,170 Div. 4, 17

MAGNESIUM REDUCTION OF TITANIUM OXIDES IN A HYDROGEN ATMOSPHERE.
Interior-assigned Patent.
by Thomas A. Henrie, Henry Dolezal, and Ernst K. Kleespies. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Refining (Metallurgy)), (*Titanium compounds, Oxides), Reduction (Chemistry), Controlled atmospheres, Magnesium, Hydrogen, Oxygen, Magnesium alloys, Fluxes (Fusion), Atmosphere.

The process is for the reduction of titanium oxides to give a product low in oxygen and alloyed magnesium, suitable for use in an electrorefining process. This is achieved by reduction of titanium oxides with magnesium metal in the presence of a flux and in an atmosphere of hydrogen.

Patent 3,140,207 Div. 4, 2, 3

PYROTECHNIC COMPOSITION.
Navy-assigned Patent.
by Mary M. Williams and Lohr A. Burkardt. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pyrotechnics), (*Pyrotechnics, Artificial precipitation), (*Artificial precipitation, Pyrotechnics), PETN, Nitrocellulose, Silver compounds, Iodates, Aluminum.

The pyrotechnic composition has use in cloud seeding. It is made of 9 percent (by weight) of nitrocellulose, 21 percent of pentaerythritol tetranitrate, 55 to 70 percent of silver iodate and 5 to 15 percent aluminum.

Patent 3,140,289 Div. 4, 3, 16

PROCESS FOR PREPARING METHYL PYRIDINIUM 2 ALDOXIME CHLORIDE.
Army-assigned Patent.
by Robert I. Ellin, David E. Easterday, and Albert A. Kondritzer. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Drugs), (*Pyridines, Synthesis (Chemistry)), Oximes, Chlorides, Cholinesterase inhibitors, Therapy, Atropine.

The product is used with atropine to alleviate the effects of an anticholine-sterase chemical such as sarin, on

animals and humans. The 1-methylpyridinium-2-aldoxime chloride is produced by alkylating pyridine-2-aldoxime with methylchloride in the presence of N,N-dimethylformamide solvent under super-atmospheric pressure.

PB-166 354 Div. 4
OTS Prices: HC $3.00/MF $0.75

National Academy of Sciences-National Research Council, Washington, D. C.
REPORT ON THE CONFERENCE ON CHEMICAL COMPOUNDS OF CERTIFIED HIGH PURITY, HELD AT THE NATIONAL ACADEMY OF SCIENCES, WASHINGTON, D. C., JUNE 22 AND 23, 1959.
17 Sep 64, 74p

Unclassified report

Partly sponsored by the National Science Foundation.

Descriptors: (*Chemical compounds, Symposia).

The Conference recommended that (1) there be established a permanent information center for compiling and disseminating complete and up-to-date information on existing sources of compounds of certified purity; (2) there be established a permanent central technical organization for identification, preparation, purification, and certification of purity of such compounds, with responsibility for providing for their distribution at reasonable cost; (3) the program embrace all compounds required by science and industry; (4) the program recognize needs and resources of countries other than the USA; (5) the research investigators assume their appropriate responsibilities; and (6) the laboratories concerned improve their communication and interchange of ideas and that research on purification and purity of compounds and on analytical chemistry be encouraged.

PB-166 394 Div. 4
OTS Prices: HC $2.00/MF $0.50

Pittsburgh Univ., Pa.
BIBLIOGRAPHY ON STRUCTURE OF CLATHRATE HYDRATES AND RELATED TOPICS,
Research and development progress rept.,
ed. by Karel A. Kase. 1963, 26p
OSW PR121

Unclassified report

Descriptors: (*Bibliographies, Hydrates), (*Hydrates, Bibliographies), (*Complex compounds, Hydrates), Chemical compounds, Sea water, Desalination, Gases, Chemical reactions.

The bibliography includes works up to 1963. They are arranged in the following order: Early works, analytical examinations, thermodynamics and statistical mechanical discussions, structural investigations, reviews, applications, and general.

PB-166 395 Div. 4, 13
OTS Prices: HC $3.00/MF $0.75

Aerojet-General Corp., Azusa, Calif.
THE MECHANISM OF DESALINATION BY REVERSE OSMOSIS.
Research and development progress rept. (Summary) for 1 Jul 63-30 Jun 64,
by B. Keilin. 30 Jun 64, 86p
Contract 14 01 0001 338
OSW PR117

Unclassified report

Descriptors: (*Sea water, Desalination), (*Desalination, Osmosis), (*Osmosis, Desalination), (*Membranes, Osmosis), Cellulose acetates, Salts, Gels, Films, Hydrolysis, Permeability, Transport properties.

Certain aspects of the swelling of secondary cellulose acetate by membrane salts were clarified and a general mechanism of lyotropic swelling covering virtually all polar polymers was postulated. The membrane salt studies resulted in the development of superior membranes employing new salt species. The depth of the active layer, previously measured by a dyeing technique, was redetermined by gradual hydrolysis of the active layer to a non-salt-retaining cellulose structure. The quantities of bound water contained in the desalination membranes before and after heat and pressurization treatments were determined and shown to vary in a manner similar to that of the total water content. The permeabilities of a number of inorganic salts were shown to vary inversely with the extent of hydration of the component ions. This finding was interpreted in terms of the bound water requirement for solution of the various ions in the membrane and lends further support to the dominance of the solution mechanism of material transport. (Author)

PB-166 397 Div. 4, 13
OTS Prices: HC $2.00/MF $0.50

Koppers Co., Inc., Pittsburgh, Pa.
THE KOPPERS HYDRATE PROCESS FOR SALINE WATER CONVERSION EXPERIMENTAL AND ENGINEERING STUDIES.
Research and Development progress rept. for 1 Jun 63-30 Apr 64,
by E. D. Brennan and P. Van Der Heem. 4 Nov 64, 39p
Contract 14 01 0001 365
OSW PR125

Unclassified report

See also PB-181 577.

Descriptors: (*Sea water, Desalination), (*Desalination, Crystal growth), (*Hydrates, Desalination), Salts, Salinity, Filters (Fluid), Crystallization, Chlorine, Chemical reactions, Water supplies.

The following topics are covered in the report: (a) hydrate crystallization studies to form larger hydrate crystals at higher rates; (b) evaluation of various filter cloths to determine their suitability for filtration and wash water distribution in the fixed-bed filter-washer system; (c) preliminary studies for the development of a filter-washer with continuously moving hydrate bed; (d) orientational studies of chlorine as a hydrating agent and of mixed hydrates.

5. Communications

Patent 3,140,360 Div. 5

MULTI-CHANNEL TAPE RECORDER AND PLAYBACK APPARATUS.
Navy-assigned Patent.
by Singleton R. Whitworth. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Magnetic recording systems), (*Magnetic recording systems, Patents), Magnetic tapes, Electronic recording systems, Control systems, Automatic.

The apparatus is for recording, storage and playback of messages. A plurality of individual record-playback units

are provided. Each unit is adapted for use in either record or playback or storage operation independently of the type of operation taking place in the balance of the units. Automatic controls are provided.

Patent 3,141,134 Div. 5, 8

DISTORTION COMPENSATION SYSTEM, FOR A POWER FREQUENCY AMPLIFIER SYSTEM HAVING TRANSPORT LAGS, UTILIZING HETERODYNE FEEDBACK.
Army-assigned Patent.
by Eugene F. Osborne, George S. Axelby, and Edward L. Smith, Jr. 14 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Power amplifiers), (*Power amplifiers, Communication systems), Distortion, Feedback, Radio transmitters.

The heterodyne feedback system is for correcting distortion in communications equipment such as SSB transmitters. The system consists of feeding back the RF output from a transmitter power amplifier stage to the input of a preceding stage of the transmitter. The feedback path contains a frequency converter stage, and may contain an amplifier and a phase controlling device. This feedback arrangement provides effective compensation for both phase and amplitude distortions which are introduced by the transmitter circuits or by noise inputs.

Patent 3,142,059 Div. 5

DOPPLER SIMULATOR.
Navy-assigned Patent,
by Robert L. Williston. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Doppler systems), (*Doppler systems, Simulators), Microwaves, Impellers, Design, Waveguides.

The doppler simulator apparatus includes a rotor, a microwave reflector forming a plurality of protuberances mounted on the periphery of the rotor, a rectangular wave encircling two-thirds of the periphery of the rotor and a slot for receiving the protuberances. One of the protuberances enters the waveguide simultaneously and at the same rate as another leaves the waveguide.

6. Detection

Patent 3,140,461 Div. 6

METHOD FOR OBTAINING HIGH RANGE RESOLUTION WITH CONTINUOUS TRANSMISSION FREQUENCY.
Navy-assigned Patent,
by Chester M. McKinney. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Sonar), (*Sonar projectors, Frequency modulation), Sonar signals, Sound ranging, Sonar equipment.

The sonar system involves the use of a continuous transmission frequency modulated system wherein a linear saw-toothed FM signal is radiated into a given medium such as water, continuously, and is reflected from an object or objects in the water. The radiated signal may have either a symmetric or asymmetric saw-toothed wave shape. The transmitted and reflected signals differ in frequency by an amount proportional to the travel time, or the distance to the object, since, the velocity of the signal in the water is constant. (Author)

Patent 3,140,484 Div. 6, 8

RANGE SWEEP AND POSITIONING CIRCUIT.
Army-assigned Patent,
by Alfred I. Mintzer. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar equipment), (*Radar equipment, Radar tracking), Circuits, Electromagnetic pulses, Tracking, Target acquisition.

The range sweep and positioning circuit are used in a pulse tracking radar system. The system includes an acquisition sweep arrangement which controls the 'range gate' sweep during the searching mode. With the acquisition of a target, an error voltage signal assumes control of the 'range gate', continuing in control for the duration of the tracking mode. Through the application of negative feed-back computer techniques during the tracking mode, the tracking radar system possesses optimum band-pass characteristics for both the searching and tracking modes. (Author)

Patent 3,142,060 Div. 6

AUTOMATIC JAMMING SYSTEM.
Navy-assigned Patent,
by Peter C. Goldmark. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar equipment), (*Radar jamming, Radar equipment), Radar signals, Radar receivers, Radar transmitters, Hom-on-jam, Frequency.

The system seeks out the frequency of the signal which is to be jammed, and transmits a jamming signal at that frequency. This system has an additional feature which is termed 'listening through.' The ' listening through' components interrupt the jamming signal periodically and permit the jamming receiver to 'listen through,' to check to see if the enemy radar signal is at the same frequency and if it is, the transmitter then continues to jam until the next 'listening through' period. If the frequency of the enemy radar has changed this system starts searching the spectrum again and locks on an jams the next signal which it encounters.

7. Electrical Equipment

CAPE-1087 Div. 7, 8

Los Alamos Scientific Lab., N. Mex.
HIGH TEMPERATURE CURRENT CONCENTRATOR.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Induction heating, Specifications), (*Radiofrequency generators, Heaters), Furnaces, Transformers, Electrical impedance, Cooling, Heat-resistant glass.

The package contains 9 drawings. The current concentrator is a high-temperature induction furnace developed for use with 20 kw, 450 kc radiofrequency generators. Its use is not necessarily limited to the stated power level and operating frequency. The design incorporates a transformer that can be adjusted to match the low electrical impedance of a small charge to that of a generator even if the frequency is as low as 10 kc. The power input is limited by the cooling system to approximately 40 kw. The charge is usually heated directly and resulting temperatures above 3800C are possible with a power input of 25 kw and no special radiation shielding. The enclosure is made of pyres. Low internal operating voltage and the absence of power feed-through terminals almost completely eliminate voltage breakdown even under the most adverse operating conditions. (AEC abstract)

Patent 3,140,459 Div. 7, 30

LOW NOISE, LOW LEVEL, PRECISION POTENTIOMETER.
Navy-assigned Patent,
by James M. Kendall. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Potentiometers), (*Potentiometers, Design), Measuring devices (Electrical and Electronic).

The potentiometer is suited for measuring very small voltages from strain gages especially those employed in pressure transducers. The device is of a type having a flexible conductive strip separating the movable contact and the resistance element. (Author)

Patent 3,140,819 Div. 7, 30

VACUUM CUT-OFF SWITCH.
Air Force-assigned Patent,
by Joseph E. Coyle. 14 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vacuum switches), (*Vacuum switches, Vacuum apparatus), Vacuum pumps, Electric motors, Batteries and components, Electric cables, Pressure.

The vacuum cut-off switch is shown in a system including an evacuation chamber, a pump, an electric motor, a battery and conduits connecting the components. A pressure responsive detecting device is associated with the switch for controlling the operation of a vacuum system.

Patent 3,141,290 Div. 7, 22

RUGGED ELECTRIC CLOCK MOVEMENT.
Army-assigned Patent,
by Paul G. Gerhard. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Timing devices), (*Clocks, Patents), (*Clock delay mechanisms, Patents), Electric connectors, Cleaning, Friction, Time delay fuzes, (fuses).

The electric clock mechanism has self cleaning contacts. It can be used in fusing applications. Self cleaning is accomplished by using a tilting index wheel and making the electrical contact identical with the mechanical contact between the indexing wheel and the indexing pin. In this manner, the number of contacting parts is a mimimum reducing the drag on the indexing wheel to a minimum, and the sliding action between the indexing pin and the tilting indexing wheel provides a self cleaning action for the electrical contacts.

Patent 3,141,715 Div. 7, 12

ELECTRICAL CONTACTOR APPARATUS FOR GUIDED MISSILES.
Navy-assigned Patent,
by Ralph F. Hereth. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric connectors), (*Electric connectors, Guided missiles), Electrical networks, Power supplies, Electric terminals, Metal plates, Hydraulic systems, Circuit interconnections.

The electrical contactor is for applying power to missile components of a guided missile. The contactor includes a plurality of pins coupled through leads to a power source. The pins are carried by a plate that moves into and out of engagement with the missile. The missile itself carries an electrical assembly which is engaged by the pins. A fast-acting fluid pressure drive simultaneously moves the pins and a pin shield.

Patent 3,141,716 Div. 7

MULTI-CONTACT CONNECTOR FOR PRINTED CIRCUIT BOARDS.
Navy-assigned Patent,
by John H. Armstrong. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric connectors), (*Electric connectors, Printed circuits), Miniature electrical equipment, Circuit interconnections, Pressure, Electric terminals.

The miniature multi-pin electrical connector is utilized with a switchboard. The connection between the terminals on the switchboard and the connector is made by a butt-type engagement or pressure contacts. The butt contacts are resiliently held in place on the terminal board. The connector is capable of withstanding extremely high G's without loss of contact.

Patent 3,141,720 Div. 7

CONNECTOR FOR PRINTED OR ETCHED FLAT CONDUCTOR CABLES.
Navy-assigned Patent,
by James G. Johnson. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric connectors), (*Electric connectors, Electric cables), Electrical equipment, Circuit interconnections, Protective coverings.

The electrical connector for flat conductor cables protects the exposed ends of the flat conductor cable when the male and female parts are disassembled. The structure is such that if the flat conductor cable is damaged the related connector need only be dismantled, the flat conductor inserted in its place and the connector reassembled. The connector may also be replaced if damaged.

Patent 3,141,936 Div. 7, 12

CONDUCTIVE SPRINGS AND BALL ACCELERATION SWITCH.
Navy-assigned Patent,
by John M. Boyle and Earl J. Donaldson. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pressure switches), (*Pressure switches, Acceleration), Rocket motors, Circuits.

The acceleration switch is utilized in a multi-stage rocket motor. The switch functions to close an electrical circuit when an accelerating force of a desired value is imposed on the switch in a given direction.

8. Electronics and Electronic Equipment

CAPE-1110 Div. 8

Los Alamos Scientific Lab., N. Mex.
MODEL 503 AMPLIFIER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Amplifiers, Clipper circuits), (*Clipper circuits, Amplifiers), Counting methods, Gain, Preamplifiers.

The amplifier is used in counting systems where medium-fast (<0.1 microsec) rise times are required. Clipping decay times of from 0.15 to 10 microsec can be supplied. The input and output are positive with linear amplitude to 60 v (100 v maximum) and a rise time of 0.06 to 0.14 microsec. Input shorted noise is 0.51 v p-p and input open, maximum gain is 0.55 v p-p. Using the 503-N preamplifier, input shorted shows a maximum gain of 3.6 v p-p. The panel is 8 3/4 in. by 19 in. with a chassis depth of 13 in. Nine drawings are included. (AEC abstract)

Patent 3,141,111 Div. 8

SPARK GAP TRIGGER CIRCUIT.
Navy-assigned Patent.
by Terry F. Godlove. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Trigger circuits), (*Trigger circuits, Patents), Electronic switches, Transmission lines, Coaxial cables, Voltage, Sources, Electromagnetic pulses, Ultraviolet radiation.

The spark gap triggering circuit is used in equipment which requires repetitive or non-repetitive triggering. The circuit includes a voltage source, an electronic switch, a spark gap switch and a coaxial cable transmission line. The circuitry produces a high voltage pulse across the spaced electrodes of the spark gap switch. The high voltage pulse produces ultraviolet light.

Patent 3,141,124 Div. 8

SHUNT REGULATING CHARGING CIRCUIT.
Navy-assigned Patent.
by Robert R. Atherton. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Circuits), (*Electric shunts, Circuits), (*Capacitors, Voltage regulators), Rectifiers, Voltage, Time.

The circuit is utilized for charging a storage device to a prescribed voltage. Controlled rectifiers are used in a fullwave charging circuit. The circuit fully charges a capacitor within a given limited time interval.

Patent 3,141,130 Div. 8, 5, 12

PHASE MEASURING CIRCUIT FOR MEASURING THE PHADE BETWEEN AN F.M. SIGNAL AND AN F.M. REFERENCE SIGNAL INCLUDING A CATHODE RAY TUBE INDICATOR.
Navy-assigned Patent.
by Robert C. Hilliard. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Circuits), (*Phase measurement, Circuits), Radar equipment, Radar signals, Cathode ray tubes, Guidance, Guided missiles, Simulation, Oscilloscopes, Microwaves, Frequency modulation, Amplitude modulation.

The circuit is utilized in connection with the analysis of signals in missile guidance radar equipment and radar simulation equipment. An amplitude modulated reference signal is applied to the vertical plates of a cathode ray tube oscilloscope while the microwave pulse signal is applied to the horizontal sweep circuit for well known Lissajous comparison.

Patent 3,141,932 Div. 8, 30

SWITCHING MECHANISM WITH ENERGY STORAGE MEANS.
NASA-assigned Patent,
by William A. Leavy. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Servomechanisms), (*Servomechanisms, Actuators), (*Actuators, Servomechanisms), Data processing systems.

The driven switch actuation mechanism includes a mechanical reset feature capable of completing its cycle of operation after the input drive has been deactivated. It may be used in association with a magnetic drum used as an information storage device. A rotatable mechanical energy storage mechanism stores energy in a coil spring as a result of the rotation of a driven object and is triggered by the object reaching a desired termination position. (Author)

Patent 3,141,981 Div. 8

PULSE GENERATING CIRCUIT HAVING A HIGH REPETITION RATE UTILIZING AVALANCHE TRANSISTOR-COAXIAL LINE COMBINATION.
Navy-assigned Patent,
by William Michael Henebry. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pulse generators), (*Pulse generators, Circuits), Avalanche diodes, Switching circuits, Transformers, Transistors, Coaxial cables.

The pulse generating circuit produces pulses at a high repetition rate. It utilizes the avalanche switching made of transistor operation to develop short rise time pulses. The circuit includes a transformer which intercouples the emitter and base circuits of the avalanche transistor in a degenerative feedback loop. (Author)

Patent 3,141,998 Div. 8

COOLED MODULAR ELECTRONIC PACKAGE.
Navy-assigned Patent.
by Harry G. Silkman. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Modules (Electronic)), (*Modules (Electronic), Printed circuits), Miniature electronic equipment, Packaged circuits, Cooling, Design.

The miniaturized modular electronic package utilizes printed circuits. The package has increased cooling efficiency and resistance to vibration. The package is in the form of a two-sided 'sandwich' with the electrical components and the cold plates on the outside and electrical insulation and printed circuit boards on the inside. (Author)

Patent 3,142,010 Div. 8

STEP SWITCH SERVO DRIVE SYSTEM.
Navy-assigned Patent,
by Irving L. Marin. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Servomechanisms), (*Servomechanisms, Electronic switches), Communication equipment, Servomotors.

The servo system operates a terminal device such as a rotary step switch having only discrete stops from a continuous input signal, and selects the nearest discrete step of switch to the input without hesitation or delay. The system is associated with communication equipment, for example, the servo motor may be oriented for a particular angle which may be the bearing on which it is desired to train or beam a sonar signal. (Author)

Patent 3,142,033 Div. 8, 31

REVERBERATION CONTROLLED GAIN AMPLIFIER.
Navy-assigned Patent,
by John W. Flowers and Elmer J. Wade. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Amplifiers), (*Amplifiers, Underwater sound equipment), Homing torpedoes, Acoustic torpedoes, Echo ranging, Sonar signals, Gain.

The amplifier is used in underwater echo-ranging apparatus associated with a homing-type torpedo. A signal amplifier is provided which automatically adjusts its sensitivity-time characteristic according to the rate of reverberation decoy of the signal returning to the torpedo. (Author)

PB-166 356 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Weather Bureau, Washington, D. C.
RESISTANCE CONTROLLED SWITCHES,
by Donald A. Mathews. Aug 64, 36p MED-9
Unclassified report

Descriptors: (*Electronic switches, Control systems), (*Resistance (Electrical), Control systems), Pulse generators, Pulse rate, Resistors, Switching circuits, Design, Semiconductive devices, Electronics, Thermostats, Diodes, Relays, Time switches.

This paper discusses pulse generators whose output pulse rates are controlled by sensor resistors, a fact which allows for the designing of unique switching systems. When high-speed pulse-switched semiconductor switches are pulsed simultaneously with switch-closing and switch-opening pulses, the fastest pulse rate dominates the switching. Proportional control may be obtained by varying the pulse rates and by varying the ratio of the relative pulse rates of closing and opening. This may be done automatically. Unique electronic thermostats are designed. Both high and low impedance circuits for controlling switches by changes of resistance are shown. The change in resistance may be in either direction. The circuits may be used in other applications for the detection of a change in a resistance. A rain actuated switch is one application. Resistance controlled solid-state relays are examined and preferred circuits are presented that have a wide application. (Author)

PB-166 357 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Weather Bureau, Washington, D. C.
SOLID-STATE FREQUENCY METER DESIGNS,
by Donald A. Mathews. Jun 64, 24p IED-8
Unclassified report

Descriptors: (*Frequency meters, Semiconductor devices), (*Semiconductor devices, Frequency meters), Diodes (Semiconductor), Radiosondes, Avalanche diodes, Circuits, Audio amplifiers, Power supplies, Reliability (Electronics), Stability, Miniature electronic equipment.

As part of a program to minify, improve, and decrease the cost of the radiosonde (sonde) ground equipment, the use of solid-state devices in the frequency meter is examined. The use of the PNPN four-layer diode in circuits that convert pulses to direct current is shown to result in new circuits. Zener diode voltage regulating circuits are designed to match these new circuits. A single PNPN diode frequency meter is designed using a Zener diode power supply (not temperature compensated) that provides a linear output. In a more elaborate circuit a Zener diode input-pulse narrower is added so that the frequency meter will linearly accept sine-wave input. Temperature-compensated Zener diodes are used in the power supply for maximum voltage regulation with no warmup needed. A pulse audio amplifier is designed using a single PNPN diode to drive a loudspeaker. It is con-

cluded that the solid-state designs are equal to vacuum-tube circuits in accuracy or linearity, and offer improvements in reliability, in stability to line voltage changes, and in minification. The new circuits permit reductions in cost, size, and weight of the units. The bulkiest item of the new compact designs is the 500-ohm, 50-henry output-filter choke that has been inherited from the vacuum-tube design. (Author)

PB-166 384 Div. 8
OTS Prices: HC $2.00/MF $0.50

Hughes Aircraft Co., Fullerton, Calif.
FERRITE LOADED TROUGH WAVEGUIDE.
Formal rept.,
by V. Galindo, K. Hering, and W. Jones.
2 Jun 64, 50p TP-64-14-17

Unclassified report

Descriptors: (*Waveguides, Propagation), (*Propagation, Waveguides), Magnetic fields, Magnetic properties, Ferrites, Antenna radiation patterns, Mathematical analysis.

The results are disclosed of a study of the propagating modes in trough waveguide loaded with ferrite slabs. The ferrite is transversely magnetized and arranged in such a manner that the magnetic bias fields may be independently controlled in the two halves of the trough. Using a transverse resonance procedure, the wave numbers of the fundamental modes are obtained. For an unbalanced magnetic bias field, one of these modes becomes leaky and has a complex propagation wave number. In this case the attenuation constant is primarily related to the degree of unbalance while the phase velocity is more nearly a function of the average of the bias fields in the two halves. Experimental measurements show fair agreement with the theory Several rudimentary radiation patterns obtained using the device as a leaky wave antenna are also shown. (Author)

9. Fluid Mechanics

PB-166 383 Div. 9, 2, 12
OTS Prices: HC $4.00/MF $0.75

Standford Univ., Calif.
CAPILLARY HYDROSTATICS AND HYDRODYNAMICS AT LOW g.
Technical rept.,
by W. C. Reynolds, M. A. Saad, and H. M. Satterlee.
1 Sep 64, 110p LG-3
Grant NSF G20090

Unclassified report

Descriptors: (*Hydrostatics, Space environmental conditions), (*Hydrodynamics, Space environmental conditions), (*Gravity, Fluid mechanics), Fluid flow, Space flight, Capillary tubes, Liquids, Vapors, Surface tension, Weightlessness, Simulation, Experimental data, Graphics, Thermodynamics.

This report is intended to provide a background of basic information for persons engaged in the design of systems involving liquid-vapor interfaces, particularly in low g environments. Included is a basic review of capillary thermodynamics and mechanics, a summary of present knowledge relating to the configuration and stability of capillary systems, discussion of the dimensionless parameters involved in modeling capillary systems, and an extensive reference list arranged by subject. (Author)

PB-166 389 Div. 9
OTS Prices: HC $3.00/MF $0.75

Aerospace Corp., Los Angeles, Calif.
AN EXPERIMENTAL INVESTIGATION OF TURBULENT SHEAR IN JET-DRIVEN VORTEX CHAMBERS,
by D. H. Ross. 1 Oct 64, 72p ATN-64(9227)5

Unclassified report

Descriptors: (*Vortices, Turbulence), (*Turbulence, Cylindrical bodies), Jets, Shear stresses, Momentum, Boundary layer, Distribution, Test facilities, Mathematical analysis, Reviews, Nuclear reactors.

Vortex flow inside a right circular cylinder driven by tangential jets placed in the curved wall was studied. The objective of the study was to determine the intensity of turbulence existing in the enclosed vortex flows which derived their angular momentum from a distribution of fluid jets. The turbulent tangential shear stress inferred from measurements was taken as a criterion of the intensity of turbulence; the values were obtained by applying an angular momentum balance, including the effects of end-wall boundary layers, to a vortex chamber having a central porous tube that extracted the angular momentum from the exit flow. The results presented include the radial distribution of tangential shear stress, the variation of mid-radius shear stress with tangential Reynolds number, and the variation of turbulent-to-laminar shear-stress ratio with tangential Reynolds number. (Author)

10. Fuels and Combustion

Patent 3,140,148 Div. 10, 4

METHOD OF TREATING EXHAUST GASES WITH URANIA-CONTAINING CATALYSTS.
Interior-assigned Patent.
by Lawrence J. E. Hofer and Robert B. Anderson.
7 Jul 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Exhaust systems), (*Air pollution, Inhibition), (*Exhaust gases, Oxidation), Catalysts, Oxygen, Aluminum compounds, Uranium compounds, Iron compounds, Oxides, Catalysis, Internal combustion engines.

Internal combustion engine exhaust gas is oxidized by passing the gas together with added oxygen over a catalyst. The catalyst consists of a carrier such as alumina, urania and ferric oxide as a promoter.

Patent 3,140,208 Div. 10, 22, 27

GASLESS IGNITION COMPOSITION FOR SOLID ROCKET PROPELLANTS.
Army-assigned Patent.
by Barnet R. Adelman. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents Rocket igniters), (*Rocket igniters, Solid rocket propellants), Potassium compounds, Perchlorates, Iron, Powder metals.

The igniter composition for a solid rocket propellant consists essentially of powdered iron of a major amount by weight and potassium perchlorate.

11. Ground Transportation Equipment

Patent 3,140,127 Div. 11, 22

AGGRESSIVE DUAL PIN TRACK.

Army-assigned Patent.
by Louis Speidel, Jr. and Edward J. Gow, Jr.
7 Jul 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vehcile tracks), (*Tracked vehicles, Vehicle tracks), (*Vehicle tracks, Pins (Mechanical)), Vehicle chassis components, Design.

The track is for track-laying vehicles. The connecting pin arrangement results in a greater portion of a given track shoe width being used for grouser. The arrangement entails the use of dual axially separated track pins integral with the track shoes.

12. Guided Missiles

Patent 3,140,427 Div. 12, 26

SERVO VALVE DRIVER.
Navy-assigned Patent,
by Robert A. Freiberg. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Magnetic drives), (*Hydraulic servomechanisms, Valves), (*Magnetic drives, Hydraulic servomechanisms), Drives, Circuits, Control systems, Guided missiles.

The magnetic control circuit and transistor driver is for a hydraulic transfer valve of the type used in guided missile control systems. A binary control circuit is provided for such a valve in which control is accomplished through regulation of the saturation time of a pair of saturable cores. (Author)

Patent 3,141,375 Div. 12

MISSILE HANDLING AND MATING SYSTEM.
Navy-assigned Patent,
by Bert M. Randall. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Transporter-erectors), (*Transporter-erectors, Guided missiles), (*Guided missiles, Transporter-erectors), Handling, Separation, Shipborne, Booster motors.

The handling system is designed primarily for shipboard handling of missiles of the type employing a separable booster charge which assists in launching of the missile. The system moves a missile and a booster separately to a mating station, mates the missile and booster together and moves the mated round to a ready service storage magazine.

13. Installations and Construction

Patent 3,141,534 Div. 13

INFLATABLE GROUND ANCHOR.
Army-assigned Patent,
by James M. Dunston. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Anchors (Structural), (*Anchors (Structural), Inflatable structures), Cables (Mechanical), Structural parts, Wire.

The ground anchor is inserted into the ground with a conventional hand tool. It is for holding a guy line. An inflatable resilient sleeve is positioned over a reduced portion of the body of the anchor. This sleeve is inflated after the anchor is in the ground and assists in holding it in the ground.

PB-166 371 Div. 13, 30
OTS Prices: HC $7.00/MF $1.75

Iowa State Univ. Iowa City.
USE OF MODELS TO PREDICT THE DYNAMIC RESPONSE OF DYNAMICALLY LOADED UNDERGROUND STRUCTURES.
Interim rept.,
by Glenn Murphy, D. F. Young, and C. W. Martin.
Nov 63, 382p
Contract AF29 601 5359, Proj. 1080, Task 108003
RTD TDR63 3064; DASA WEB13 100

Unclassified report

Continuation of Contract AF29 601 4375.
See also AD-274 294.

Descriptors: (*Underground structures, Models (Simulations)), Aluminum, Cylindrical bodies, Structures, Structural properties, Loading (Mechanics), Blast, Simulation, Shock tubes, Strain gages, Soil mechanics.

Similitude requirements for predicting the dynamic response of underground structures are investigated, and the validity of the proposed model design conditions is checked experimentally. The structures used in the tests were hollow aluminum cylinders instrumented with SR-4 strain gages. Most of the tests were run on circular cylinders having diameters of 4 in., 2 in., and 1 in. Some data are also presented for structures having square cross sections. In all tests the structures were buried in dry Ottawa sand. Three different types of loaders were used in the test program: a dropweight loader, a vertical shock tube, and a horizontal shock tube. Peak strain and complete strain-time curves were obtained for various depths of burial and a detailed analysis of the data is presented. For the one series of tests performed with the horizontal shock tube no consistent data were obtained and a discussion of the discrepancies encountered is presented. Several series of tests were completed with the drop-weight loader and the vertical shock tube. The results of these tests indicate that the proposed similitude requirements are satisfactory within the range of parameters investigated. (Author)

PB-166 385 Div. 13, 25
OTS Prices: HC $2.00/MF $0.50

Wisconsin Univ., Madison. Engineering Experiment Station.
EIGENVALUES AND MODIFYING QUOTIENTS OF VIBRATION OF BEAMS.
Rept. no. 25,
by T. C. Huang. Jun 64, 35p
Grant NSF GP2359

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Beams (Structural), Vibration), (*Vibration, Functions), (*Functions, Beams (Structural)), Elasticity, Mechanics, Differential equations, Equations, Boundary value problems, Tables, Graphics.

The Timoshenko beam theory, which is nearly exact, is often used to supplement the classical theory of beam vibrations when the latter is inadequate. The use of this theory requires the eigenvalues of frequency equations. This report provides these eigenvalues for various types of beams and for a useful range of beam parameters.

PB-166 396 Div. 13, 4, 20
OTS Prices: HC $7.00/MF $1.75

Catalytic Construction Co., Philadelphia, Pa.
A STUDY OF DESALTING PLANTS (15 to 150 mgd) AND NUCLEAR POWER PLANTS (200 to 1500 MWt) FOR COMBINED WATER AND POWER PRODUCTION.
Research and development progress rept.
4 Nov 64, 396p
Contracts 14 01 0001 367, AT30 1 3316
OSW PR124

Unclassified report

Prepared in cooperation with Nuclear Utility Services, Inc., Washington, D. C.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sea water, Desalination), (*Desalination, Industrial plants), (*Power plants (Establishments), Electric power production), Water supplies, Costs, Steam, Nuclear reactors, Boilers, Turbines, Generators, Tables.

This report presents the results of an economic analysis of dual-purpose plants for the combined production of electric power and potable water from sea water. In these plants, high pressure steam is fed to a turbo-generator for the production of electric power. Low pressure steam is exhausted from the turbine at 40 pounds per square inch absolute, and condensed in the brine heaters of a multistage flash water desalting plant. Two different types of steam supply systems have been studied: nuclear reactors and conventional boilers fired with natural gas. The nuclear reactors fall into two classes: a 'low temperature' type producing saturated steam at 500-600F, and a 'high temperature' type, producing steam at 1000F. Also, two classes of fossil fuel plants were postulated, delivering steam at conditions comparable to the two classes of nuclear reactors. In addition to the dual-purpose plants, calculations were made to determine the cost of producing water in single purpose water only plants. All calculations were made for each of three rates of fixed charge on invested capital, 4%, 7% and 14%. (Author)

14. Materials (Non-Metallic)

Patent 3,139,814 Div. 14, 26

DEVICE FOR BAILING PAPER OR THE LIKE.
Small Business Administration-assigned Patent.
by Lovett Sanders. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Packaging), (*Packaging, Paper), (*Paper, Packaging), Industrial equipment, Machines.

The paper bailing device has a platform, a removable spindle held by a spindle clamp, a pivoted upper lever, slotted to pass the spindle and counterweighted for ease of operation, a string attachment plate secured to the spindle, and string extending from storage receptacles over the platform and down along the spindle to the string attachment apparatus.

Patent 3,140,191 Div. 14

LINSEED OIL EMULSION COMPOSITIONS COMPRISING DIPICOLINATE AND LINSEED OIL-DERIVED EMULSIFIERS.
Agriculture-assigned Patent.
by William L. Kubie. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Paints), (*Paints, Colloids), Oils, Cobalt compounds, Esters, Glycols, Zinc compounds, Oxides, Titanium compounds, Dioxides.

The paint is a stable emulsion of a drying oil in water. The emulsion contains 0.08 percent (based on the oil) of cobalt naphthenate, form 0.1 to 0.5 percent of the ammonium salt of dipicolinic acid in ethylene glycol as a stabilizer for the cobalt, a hydrophobic linseed oil derived emulsifier, a hydrophilic enthenoxylated linseed oil-derived emulsifier, zinc oxide and titanium dioxide.

Patent 3,140,193 Div. 14, 20

PROCESS FOR PRODUCING OXIDATION RESISTANT REFRACTORY COATING ON DENSE GRAPHITE.
AEC-assigned Patent.
by James S. Kane. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Refractory coatings), (*Refractory coatings, Graphite), (*Graphite, Reactor moderators), Reactor materials, Silicon compounds, Carbides, Coatings, Antioxidants.

The coated graphite may be used in fabricating components of nuclear reactors such as moderator pieces. A graphite substrate has bonded onto it a porous layer of silicon carbide. An outer coating of silicon metal is interlaced with the carbide coating.

Patent 3,140,245 Div. 14, 17

DULLING HARD ALUMINUM OXIDE COATINGS ON ALUMINUM-RICH BASIS METALS.
Army-assigned Patent,
by Anthony Gallaccio and Reyburn W. Wick.
7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Refractory coatings), (*Refractory coatings, Reflection), (*Aluminum, Refractory coatings), Aluminum compounds, Oxides, Coatings, Surface-active substances, Phosphoric acids, Chromium compounds, Finishes and finishing.

The reflectivity of hard anodized aluminum oxide coatings on an aluminum-rich basis metal article is minimized by treating the article with an aqueous solution. The solution consists of phosphoric acid of about 0.38 to 0.57 molarity, chromium trioxide of about 0.12 to 0.18 molarity and about 0.01 weight percent of a surface active agent.

Patent 3,141,328 Div. 14, 30

SNAG TESTER.
Army-assigned Patent,
by Louis I. Weiner and Clarence J. Pope. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Textiles), (*Textiles, Test equipment).

The device measures the resistance of fabrics to snagging. It simulates the type of snagging encountered in the actual use of fabrics. A freely swinging needle is utilized to produce a snag. The radius of the arc is increased by a measured amount until the needle snags the fabric material. The depth of penetration is a measurement of snag resistance.

15. Mathematics

PB-166 391 Div. 15
OTS Prices: HC $1.00/MF $0.50

Digital Systems Lab., Princeton Univ., N. J.
A METHOD OF PRODUCING A BOOLEAN FUNCTION HAVING AN ARBITRARILY PRESCRIBED PRIME IMPLICANT TABLE.
Technical rept.,
by J. F. Gimpel. Mar 64, 24p PU-DSL-35
Unclassified report

Descriptors: (*Special functions (Mathematical), Matrix algebra), (*Matrix algebra, Special functions (Mathematical)), Tables, Functions, Synthesis, Numerical methods and procedures, Algebras, Theorems.

Given any (possibly incomplete) table of combinations specification for a Boolean function, a prime implicant table can be defined (the prime implicant table is represented as a one-zero matrix whose rows correspond to the prime implicants and whose columns correspond to the ONE-states). This paper examines the question of whether every one-zero matrix can be interpreted as the prime implicant table of some Boolean function specification. A one-zero matrix is said to be coverable if it contains no all-zero column. It is shown by construction that every coverable one-zero matrix has the following two properties. Firstly, it can be interpreted as the prime implicant table of some incomplete specification for a Boolean function. Secondly, it can result from the prime implicant table of a complete specification for a Boolean function by conventional reduction arguments. If the one-zero matrix is not coverable, then it can be interpreted as a prime implicant table of what can be considered as an unrealizable Boolean function specification. If an m by n coverable one-zero matrix is free of row-dominance (and in particular if it is cyclic) then the incomplete specification for a Boolean function can be synthesized using n variables; otherwise, m + n variables will always suffice. The complete specifications can be obtained from the incomplete specification using two additional variables. (Author)

PB-166 392 Div. 15
OTS Prices: HC $2.00/MF $0.50

Adelphi Univ., Garden City, N. Y.
ON THE CONVERGENCE OF POWERS OF TRIANGULAR MATRICES,
by Mary Louise Buchanan. Sep 64, 30p AGM-117
Grant NSF GP1216 Unclassified report

Descriptors: (*Matrix algebra, Sequences), (*Sequences, Matrix algebra), Power series, Series, Theorems, Numbers.

In this paper, concern was given to triangular matrices only. It was shown that under certain boundedness conditions, for a family F of matrices A, the sequences A to the nth power converge uniformly to uniformly bounded limits if, for all A in F, the eigenvalues less than 1 in absolute value are uniformly bounded less than 1.

PB-166 393 Div. 15
OTS Prices: HC $2.00/MF $0.50

Adelphi Univ., Garden City, N. Y.
ON THE QUANTITIES OF THE NORM OF THE MATRIX A TO THE nth POWER FOR TRIANGULAR MATRICES,
by Mary Louise Buchanan. Sep 64, 36p AGM-118
Grant NSF GP1216
Unclassified report

Descriptors: (*Matrix algebra, Sequences), (*Sequences, Matrix algebra), Power series, Series, Theorems, Inequalities.

16. Medical Sciences

CAPE-1083 Div. 16

Oak Ridge Gaseous Diffusion Plant, Tenn.
ZONAL CENTRIFUGE, A-IX.
Engineering materials.
Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Centrifuges, Specifications), Cells (Biology), Separation, Impellers, Design.

This package contains 3 drawings. The centrifuge was developed under the joint National Institute of Health-Atomic Energy Commission Zonal Centrifuge Development Program. It is used in a program seeking zonal centrifuge systems for the separation of cells and subcellular particles including viruses and biocolloids. The Al rotor of the A-IX centrifuge permits higher speeds and more stable operating conditions than the A-V rotor which it replaces. This rotor is used with the PR-2 centrifuge drive. Thick transparent lucite end caps permit visual study. The 1300 ml rotor volume is divided into eight lucite sector-shaped compartments. The central lucite core is a single 45cone. Flow lines to the rotor edge pass over the lucite septa, thus leaving the entire sector-shaped compartment unobscured. The centrifuge is designed for a speed of 6000 rpm. (AEC abstract)

Patent 3,140,713 Div. 16, 9

INTRADERMAL NOZZLE FOR JET INJECTION DEVICES.
Army-assigned Patent.
by Aaron Ismach. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nozzles), (*Nozzler, Injection (Medicine)), (*Injection (Medicine), Nozzles), Jets, Injection, Medical equipment.

The jet injection apparatus is used for mass inoculations and injections. The nozzle has an orifice set at an angle of 45 degrees from a longitudinal axis of the hypodermic jet injection apparatus. Surrounding the orifice is a concentric forwardly protruding shoulder. (Author)

17. Metallurgy

Patent 3,139,658 Div. 17, 26

PRODUCTION OF TUNGSTEN OBJECTS.
Navy-assigned Patent.
by Abner Brenner, Walter E. Reid, Jr., and Jean H. Connor. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Metallurgy), (*Tungsten, Manufacturing methods), Hydrogen, Fluorides, Vapors.

A method is disclosed of producing tungsten objects by chemical deposition from the vapor phase. The vapor deposition of tungsten is accomplished via the hexafluoride on a thin-walled, heated object in the presence of hydrogen. The process may be performed by any number of structural arrangements several of which are commercially available.

Patent 3,140,171 Div. 17, 4

PROCESS FOR PREPARATION OF URANIUM METAL.
AEC-assigned Patent.
by John H. Trapp. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Uranium), (*Uranium, Preparation), Metals, Recovery, Reduction (Chemistry).

The process is for preparing uranium metal by charging a reduction bomb with a mixture of UF4 and magnesium and heating until the mixture undergoes an exothermic reaction, whereby uranium metal and slag are formed and the uranium metal is recovered. An improvement in the process involves the additional use of metallic lithium within the mixture and maintaining the zone at about 1400 degrees F.

PB-166 379 Div. 17
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
SOLID SOLUTION HARDENING OF ALPHA AND BETA TITANIUM.
Interim technical rept. no. 1, 19 Aug-30 Nov 53, by J. B. McAndrew and H. D. Kessler. 30 Nov 53, 14p IITRI-B-060-2
Contract DA11 022ORD1439, Proj. TB4 15
AD 37 315

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Titanium alloys, Hardening), (*Hardening, Titanium alloys), Solid solutions, Aluminum, Iron, Vanadium, Molybdenum, Chromium, Manganese, Silicon, Boron, Oxygen, Nitrogen, Carbon, Hardness, Tensile properties, Toughness, Iodides, Forging, Quenching (Cooling), Rolling (Metallurgy), Heat treatment, Tests, Phase studies, Metallography.

A report of an investigation conducted to determine quantitatively the separate effects of Al, Fe, V, Mo, Cr, Mn, Si, B, O, N, and C as solid solutes in alpha titanium and of Cr, Fe, Mn, Mo, and V as solid solutes in beta titanium is discussed. The effects of the combination of 2 or 3 of these elements on alpha and beta solid solution of Ti are being studied. Satisfactory retention of soft beta may be expected in the beta specimens except the 5% Fe and 8% Mn alloys. Percentage reductions which were calculated after the rolling tests are listed for Cr, Fe, and Mo. The following compositions were found to be suitable for the study of beta phase hardening in binary Ti alloys: 7, 11, 15% Cr; 5, 9, 13% Fe; 11, 19, 28% Mo; 15, 20, 25% V; and 8, 12, 18% Mn.

18. Military Sciences and Operations

No Entries

19. Navigation

Patent 3,141,960 Div. 19, 8, 31

DECADE COUNTER WITH ANALOG DISPLAY FOR USE WITH AIRBORNE VEHICLE NAVIGATION MEANS.
Navy-assigned Patent.
by David Biser. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Navigational aids), (*Navigational aids, Sonar equipment), Aircraft, Towed sonar, Echo ranging, Counting methods, Analog systems, Display systems.

The ranging device is for the navigation of an airborne vehicle such as a helicopter. The helicopter tows a fish which is electrically connected to the helicopter. The fish contains a sonar transmitter-receiver and ranging equipment of which the counter forms a part. Two responders and the other components are used to obtain navigational data. The output of the counter is connected by cable to a milliammeter in the helicopter. (Author)

20. Nuclear Physics and Nuclear Chemistry

CAPE-50 Div. 20, 4, 17

National Lead Co., Cincinnati, Ohio.
FEED MATERIALS PRODUCTION CENTER REFINERY-KEROSENE-TBP PROCESS.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Refineries, Specifications), (*Reactor fuel processing, Refineries), (*Uranium compounds, Purification), Ores (Metal sources), Oxides, Separation, Nitric acid, Uranyl radicals, Nitrates, Organic solvents, Kerosene, Phosphates, Vapors, Absorption, Wastes (Industrial).

The Feed Materials Production Center Refinery is used to process uranium ore concentrates to highly

purified uranium trioxide (UO3). This is accomplished by: digestion of the ore concentrates in nitric acid; extraction of the uranium from the resulting uranyl nitrate slurry with tri-butyl phosphate in pulsed, perforated-plate extraction columns; and denitration to UO3 by calcination of the aqueous uranyl nitrate. Auxiliary facilities include a nitric acid recovery system for absorbing nitric oxide vapors, an organic solvent treating system that permits the recycling of the tributyl phosphate solvent, and a sump system for the precipitation and recovery of uranium values in waste liquor streams. (AEC abstract)

CAPE-955 Div. 20, 7

Oak Ridge National Lab., Tenn.
ELECTROMAGNETS FOR THE BULK SHIELDING REACTOR (BSR-II).
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Electromagnets, Specifications), (*Nuclear reactors, Electromagnets), Safety devices, Magnetic materials, Performance (Engineering).

The package contains 13 drawings. The drawings describe high-load-capacity canned magnets of consistently uniform quality that were designed for the BSR-II. Rapid, spring-accelerated, safety rod insertion is substituted in the BSR-II for the simple gravity drop of safety rods used in BSR-I. Fabrication techniques minimized the internal air gap and produced maximum performance from the magnet material by using the same amount of space that was used in the PCA magnet of BSR-I. (AEC abstract)

CAPE-999 Div. 20, 8

Los Alamos Scientific Lab., N. Mex.
ELECTRON GUNS, 2 AND 4 INCH.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Electron guns, Specifications), (*Electron accelerators, Electron guns), Amplifiers, Vacuum systems, Ion pumps, Space charges, Pulse generators.

Forty-two drawings are included. The electron guns are used as sources in the Single Cavity High Current Electron Accelerator, which is a full scale prototype of the triple cavity, high current accelerator. The single cavity accelerator will be used in studies of high current electron streams. The machine employs a 2.4 m long, 50 Mc cavity in which fields up to 5,000,000 v/m have been achieved. Excitation power is generated by two tuned-plate, tuned-grid amplifiers. Four 250-liter/sec Vac Ion pumps hold the cavity pressure in the low end of the 10 to the -7 power mm Hg range. One 400-liter/sec Vac Ion pump is used to exhaust the electron gun chamber to comparable pressure. The electron sources operate space charge limited up to at least 250 kv with a perveance of about 1,000,000. Square wave pulses, 0.2 microsec long, are generated by a pulser. (AEC abstract)

CAPE-1021 Div. 20, 7

General Nuclear Engineering Corp., Dunedin, Fla.
BOILING NUCLEAR SUPERHEATER (BONUS) REACTOR.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Power reactors, Specifications), (*Boiling water reactors, Specifications), Power plants (Establishments), Containment, Generators, Steam turbines, Control systems, Pressure vessels, Steel, Cladding, Stainless steel, Control rods, Boron alloys.

Thirty-two specifications and 109 drawings are included. The BONUS Reactor is designed for net electric output of 16.3 Mev, to deliver 152,000 lb/hr of steam at 850 psig, and 50 Mwt with a plant efficiency of 32%. The reactor is located in a containment structure with a hemispherical dome. The structure will house the nuclear reactor, turbine-generator, control room, and most of the associated equipment systems and service rooms of the nuclear power plant. The pressure vessel is made of 2.75 in. thick carbon steel that is clad internally with 0.25 in. stainless steel. It is 7 ft ID, 27.5 ft. high, and weighs 57 tons. The reactor is controlled by 17 stainless steel rods containing 2% boron. (AEC abstract)

CAPE-1025 Div. 20, 17

Health and Safety Lab., New York Operations Office, N. Y.
BORON METAL PLAN.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Boron, Production), Metals, Specifications, Reduction (Chemistry), Electrolysis, Isotope separation, Radioactive isotopes, Boron compounds, Flourides, Ethers.

This package contains 126 units. An ether complex of BF3 is used as feed in a plant that produces 500 kg/year of boron (95% B(10)) via the following steps: isotope separation, electrolytic reduction, and hydrogen-hot wire reduction. (AEC abstract)

CAPE-1059 Div. 20, 30

Los Alamos Scientific Lab., N. Mex.
VACUUM CLEANER WITH CYCLONE SEPARATOR.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Vacuum cleaners, Specifications), Radioactive waste, Decontamination, Separation.

This package contains 1 drawing. This vacuum cleaner is used to pick up radioactive material. Particulates are removed from the air-stream with a small cyclone separator, which is followed by a highly efficiency filter. The vacuum cleaner employs an Electrolux motor and fan. A dust collector is connected to this equipment by a 1.5-in. copper tube. The fan, motor, and filter are contained in a fir-plywood box. The equipment needs a space 20 in. long x 9.69 in. wide and 23.75 in. high. (AEC abstract)

CAPE-1065 Div. 20

American Bosch Arma Corp., Springfield, Mass.
HYDRAULIC CONTROL ROD DRIVE.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Hydraulic equipment, Control rods),

(*Reactor fuel rods, Hydraulic equipment), (*Control rods, Specifications), Drives, Hydraulic actuators, Nuclear reactors, Feedback, Pressure vessels, Magnetic fields, Pistons.

Six photographs and 383 drawings are included. The hydraulically operated control and actuator is used in pressurized-water and boiling-water nuclear reactors. Primary reactor water is used to operate the mechanism, and this section is completely sealed within the pressure vessel for zero leakage. Signals to the control sleeves and the feedback signals of control rod position are transmitted through the pressure vessel wall by means of a magnetic-field coupling, which eliminates use of shaft sleeves. The actuator features a hydraulic feedback within the power unit that equalizes load and hydraulic forces. A change in the hydraulic force causes power piston motion that through the feedback coupling, actuates the serve piston. The position of the control rod within the pressure vessel is transmitted by means of a digital readout system. (AEC abstract)

CAPE-1085 Div. 20

Hanford Atomic Products Operation, Richland, Wash.
WATER MONITORING SYSTEM.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Monitors, Specifications), (*Reactor coolants, Monitors), Water, pH, Electrical conductance, Chlorides, Sodium, Oxygen, Hydrogen, Hydrazine, Hardness, Nuclear particles, Gamma rays, Recording systems, Automatic.

Seventeen drawings and 1 specification are included. The system is used to automatically monitor variables on 113 sample streams coming from various reactor cooling systems. The streams are monitored for pH, conductivity, chlorides, sodium, oxygen, hardness, hydrogen, hydrazine, and radiation. Results are printed out on 35 recorders. Annunciators warn of any variables that exceed preset limits. (AEC abstract)

CAPE-1096 Div. 20

Chicago Operations Office, Atomic Energy Commission, Ill.
LA CROSSE BOILING WATER REACTOR (LACBWR).
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Boiling water reactors, Specifications), Design, Reactor control, Reactor cores, Reactor fuel rods, Reactor coolants, Reactor moderators.

There are 518 pages of specifications and 28 engineering drawings in this package. The La Crosse Boiling Water Reactor (LACBWR) is a direct-cycle, forced-circulation boiling-water reactor that is cooled and moderated by light water. The reactor operates at a pressure of 1300 psia and produces 165 Mwt. The reactor is controlled by 29 cruciform control rods. The core is loaded with 288 fuel elements having a total uranium content of 8600 kg. Each fuel element is composed of 25 fuel rods in 5 x 5 array which are loaded with UO2 pellets that have been enriched to approximately 3.4%. The reactor and most of the equipment associated with the nuclear steam supply system are located in the containment building. The reactor is being developed under the Second Round Power Demonstration Reactor Program. (AEC abstract)

Patent 3,140,151 Div. 20

METHOD OF REPROCESSING UO2 REACTOR FUEL.
AEC-assigned Patent.
by James R. Foltz, Weldon J. Gardner, and Sydney Strausberg. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Patents), Reactor fuels, Uranium compounds, Dioxides, Sintering, Oxidation-reduction reactions.

The method of reprocessing sintered, irradiated uranium dioxide reactor fuel involves several cycles. Each cycle comprises oxidizing UO2 to U3O8 and then reducing the resulting U3O8 to UO2 with hydrogen.

Patent 3,140,234 Div. 20

FAST REACTOR CORE.
AEC-assigned Patent.
by Walter B. Loewenstein. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Fast reactors, Reactor cores), (*Patents, Reactor cores), (*Reactor cores, Liquid metal cooled reactors), Uranium, Plutonium, Subcritical assemblies, Reactor fuels.

The light-metal-cooled fast nuclear reactor core consists of a plurality of subcritical, slab-shaped fuel regions containing plutonium-239 loosely coupled by slap-shaped blanket zones containing depleted uranium disposed therebetween.

Patent 3,140,235 Div. 20

DOWNFLOW PACKED BED NUCLEAR FISSION REACTOR.
AEC-assigned Patent.
by Loranus P. Hatch and Thomas V. Sheehan. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear reactors, Reactor fuels), Particles, Reactor coolants, Fluid flow, Fission.

The nuclear reactor has a settled bed of fuel particles during normal operation. The coolant direction of flow is changed for rearranging the fuel particles or withdrawing or replacing fuel.

Patent 3,140,236 Div. 20

NUCLEAR REACTOR WITH IMPROVED BEAM TUBE.
AEC-assigned Patent.
by Charles N. Kelber. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear

reactors, Beam holes), Reactor cores, Reactor reflectors, Light water reactors, Beryllium.

The nuclear reactor structure includes a core, a beryllium reflector surrounding the core, and a horizontal beam tube penetrating the reflector in combination with a layer of light water immediately adjacent the tip of the beam tube. The layer of water is separated from the core by a layer of beryllium.

Patent 3,140,237 Div. 20

LARGE FAST NUCLEAR REACTOR.
AEC-assigned Patent.
by Russell E. Peterson and Samuel L. Stewart.
7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fast reactors), (*Fast reactors, Design), (*Nuclear reactors, Fast reactors), Reactor system components.

The large fast nuclear reactor has a plurality of fissionable regions and a barrier separating each of these regions from adjacent fissionable regions. The barrier includes a moderator region and two thermal neutron absorber regions.

Patent 3,140,238 Div. 20

CHARGING AND SERVICE MACHINE FOR GAS-COOLED REACTORS.
AEC-assigned Patent.
by Arthur P. Fraas and John J. Tudor. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gas-cooled reactors), (*Gas-cooled reactors, Maintenance equipment), Nuclear reactors, Maintenance.

A single unit is provided for both charging and servicing of neutronic reactors. The machine is fixed and does not require gas locks or seals. The structure is such that no moving parts remain within the unshielded portion of the reactor.

Patent 3,140,394 Div. 20

MEANS FOR DETERMINING THE DIRECTION AND VELOCITY OF NUCLEAR PARTICLES.
Atomic Energy Commission-assigned Patent.
by Arthur Roberts. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear particles), (*Nuclear particles, Image intensifiers (Electronics)), Velocity, Determination, Photoelectrons, Cerenkov radiation, Radiation measurement systems.

The velocity and direction of one or more nuclear particles can be determined when a photo-electronic image intensifier is operated in a Cerenkov detector system so that a well-defined ring of light corresponding in size and location respectively with the particle velocity and direction is produced from the detector and superimposed on an image intensifier sensitive to the dominant wave lengths of the image produced. A variable directional application of the image is applied to the image intensifier and the output of the image intensifier is a variable directional image from which the velocity and direction of one or more of the particles in the Cerenkov radiator are determined.

Patent 3,140,397 Div. 20

NEUTRON DETECTOR UNIT UTILIZING INDIUM.
Atomic Energy Commission-assigned Patent.
by Hugh F. Henry. 7 Jun 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Neutron detectors), (*Neutron detectors, Indium), Manganese, Cadmium, Shielding, Personnel, Dosimeters.

The detector unit is shown in combination with a badge to be worn by personnel. The neutron detector includes an indium body and a manganese body. A common indium shield and a common cadmium shield encompass the indium body and the manganese body.

Patent 3,140,398 Div. 20

NEUTRON DOSIMETER UTILIZING A FISSION FOIL.
Atomic Energy Commission-assigned Patent.
by Paul W. Reinhardt and Francis J. Davis.
7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Dosimeters), (*Dosimeters, Neutron detectors), Thermal neutrons, Fast neutrons, Foils, Fission products, Shielding.

The device accomplishes in situ counting with a fission detector, of the fission fragments from a composite foil. The foil is uniformly coated with suitable materials for detecting the neutron flux of a typical fission spectrum. The detector and foil are enclosed within suitable thermal neutron shielding for eliminating thermal neutrons. The detector is connected to suitable instrumentation for providing a direct indication of the fast neutron spectrum to terms of dose.

Patent 3,141,380 Div. 20

DRIVE MECHANISM.
AEC-assigned Patent,
by Arthur M. Harris and Eric Ledin. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Drives), (*Drives, Control rods), (*Gas-cooled reactors, Drives), Deceleration, Reactor cores, Nuclear reactors.

The control rod drive mechanism is for nuclear reactors. The mechanism is in the form of a pressure fluid drive. The structure includes a deceleration device which is operable to retard the final movement of the control rod into the reactor core. The mechanism is for use with reactors of the gas-cooled type.

Patent 3,141,413 Div. 20

REVERSIBLE ELECTROMAGNETIC FLUID PUMP.
Atomic Energy Commission-assigned Patent.
by Heyman, Henry. 21 Jul 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Coolant pumps), (*Nuclear reactors, Coolant pumps), (*Coolant pumps, Reactor coolants), Electromagnetic pumps, Electrical conductance, Design, Coils.

The pump is for circulating electrically conductive coolant in a nuclear reactor. Exciting coils are provided for the pump which have such a geometry of connecting terminals which, in combination with a selected geometry of terminals on the fluid duct, permits convenient reconnections to be made of the excitation coils to obtain pumping reversibility without damage to any of the connecting terminals.

Patent 3,141,827 Div. 20

BREEDER REACTOR CORE WITH ALTERNATE ZONES OF DEPLETED AND ENRICHED FUEL.
AEC-assigned Patent,
by Haig P. Iskenderian. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor cores), (*Reactor fuel elements, Breeder reactors), Reactor fuels, Reactor control.

Depleted fuel elements are employed to obtain shim control in a nuclear reactor. The depleted fuel elements absorb neutrons to produce additional fissionable material. The depleted fuel elements are so located in the reactor as to obtain maximum benefit from the fissionable material produced therein and at the same time eliminate local criticalities. This is accomplished by interspersing depleted elements among slightly enriched elements.

Patent 3,141,829 Div. 20

FUEL ELEMENT.
AEC-assigned Patent.
by Lloyd R. Zumwalt and David C. Morse. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel elements), (*Reactor fuel elements, Gas-cooled reactors), Nuclear reactors, Heat transfer, Reactor coolants, Power.

The fuel element is for a gas cooled neutronic reactor. A plurality of the fuel elements are capable of operating in a reactor at high temperatures to provide high power density and a high degree of efficiency of heat transfer therefrom to a coolant. The fuel element does not require the usual metallic jacket and fins.

Patent 3,141,911 Div. 20

PROCESS FOR THE FABRICATION OF NUCLEAR FUEL ELEMENTS.
AEC-assigned Patent.
by Joseph J. Hauth. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel elements, Production), Reactor fuels, Powders, Radioactivity, Vibration, Compressive properties.

The fuel element contains a compacted radioactive powder. The powder is compacted by mechanical vibration. The vibrations are applied to the open upper end of the fuel tube while the tube is vertically suspended at its upper end.

Patent 3,141,971 Div. 20, 4, 14

METHOD OF PREVENTING FILM DEPOSITS FROM ORGANIC COOLANT IN THE PRESENCE OF ELECTRON IRRADIATION.
AEC-assigned Patent.
by Harry W. Parker. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Organic cooled reactors), (*Organic cooled reactors, Coolants), (*Films, Organic cooled reactors), Organic materials, Fouling, Nuclear reactors, Linear accelerators, Inhibition, Electrostatics.

The method relates to linear accelerators and nuclear reactors. The deposition of ferrous material from iron-contaminated polyphenyl coolants on surfaces being cooled by the coolants while undergoing irradiation by electrons is reduced by the method. The surface is electrically insulated and an electrically grounded metal electrode is placed in the path flow of the coolant. (Author)

PB-166 297 Div. 20, 2
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RAIN SCAVENGING OF RADIOACTIVE PARTICULATE MATTER FROM THE ATMOSPHERE,
by S. M. Greenfield. 16 Jul 56, 34p P-883-AEC
Contract AT11 1 135
Unclassified report

This paper prepared for publication to the Journal of Meteorology and prepared for presentation at the Meteorological Society Meeting in Albuquerque, New Mexico, 6 Sep 56.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Raindrops, Radioactive fallout), (*Radioactive fallout, Raindrops), (*Atmosphere, Radioactive fallout), Particles, Solids, Particle size, Coagulation, Clouds, Water, Half life, Electrostatics, Ionization, Mathematical models, Equations, Symposia.

Based on Langmuir's theory of collection efficiencies, a model is derived to explain the removal of radioactive particulate matter from the atmosphere by rain. In this connection Langmuir's collection efficiencies are modified to take into account the density of the solid particles, and are adjusted to express the fraction removed from a vertical cylinder of constant diameter. It is assumed that electrostatic effects can be neglected in the presence of ionizing radiation. It is found that direct interaction of rain drops and particles does not account for the efficient removal of material whose diameter is below approximately 1 micron. To explain the removal of these smaller particles, a further mechanism is investigated. This consists of allowing the particles to mix with the water cloud before the rain starts. Small particles that are scavenged by cloud droplets by a process of coagulation are then placed in a position to be more efficiently removed by the rain.

Fractions of a given particle size removed as a result of both these mechanisms operating are presented as a function of rainfall rate and time, and application is made to an assumed size distribution of radioactive solid particles. (Author)

PB-166 299 Div. 20
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A MATHEMATICAL MODEL OF THE PHENOMENON OF RADIOACTIVE FALLOUT,
by R. R. Rapp. 15 Jun 56, 20p P-882-AEC
Contract AT11 1 135
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radioactive fallout, Mathematical models), Nuclear explosions, Nuclear bombs, Fission products.

To describe the phenomenon of fallout we must, of course, begin with the nuclear detonation. The main distinguishing feature of a detonation of this type is a tremendous release of energy almost instantaneously and within a very small space. This release of energy creates a hot bubble of air which rises because of its buoyancy. The characteristic mushroom-shaped cloud associated with nuclear explosions is formed by water vapor condensed as a result of vertical lifting. The temperature gradient between the hot bubble and the surrounding atmosphere causes a strong toroidal circulation. Another unique feature of a nuclear explosion is the formation of fission fragments. These are the end products of the splitting of the uranium atoms and are almost all radioactive. Fission fragments, together with any other debris mixed into the fireball at an early stage, are carried aloft, and as the cloud rises, some of the material may be left behind forming a wake or stem. The cloud will stop rising when the energy available to lift it has dissipated. Within this stabilized cloud are vitually all the fission products formed by the nuclear detonation. Radioactive particles may be formed by condensation of vaporized material or by the coalescence of fission products with solid or liquid earth particles.

PB-166 304 Div. 20, 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
IONIZATION OF RADIOACTIVE PARTICLES IN THE FREE AIR,
by S. M. Greenfield. 5 Jul 55, 16p P-701-AEC
Unclassified report

To be submitted to the Journal of Geophysical Research. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radioactive fallout, Ionization), (*Ionization, Charged particles), (*Charged particles, Atmosphere), Air, Half life, Nuclei, Dust, Condensation, Radioactive decay, Clouds, Nuclear explosions, Electrons, Equations.

In order to evaluate the possible role of radioactive particles from an atomic cloud as condensation nuclei, an analysis has been made to determine their degree of ionization. Individual radioactive particles become ionized due to beta emission, and an estimate of the half-life of these ions has been made for various times in the life history of an atomic cloud. It is concluded that while there is a transient charge on these particles, its half-life is small compared to the disintegration rate, with the result that for all practical purposes radioactive particles in the free air are not necessarily preferred condensation nuclei. (Author)

PB-166 305 Div. 20, 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THERMODYNAMICS OF THE THOMAS-FERMI ATOM AT LOW TEMPERATURES,
by J. J. Gilvarry. 15 Jan 54, 38p P-474-AEC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Atoms, Thermodynamics), (*Thermodynamics, Atoms), Mathematical analysis, Partial differential equations, Perturbation theory, Low-temperature research, Statistical mechanics.

It is shown that an expression for the Helmholtz function on the Thomas-Fermi atom model permits one, in the limit of low temperature T, to expand the total energy as an asymptotic series in T squared. Thermodynamic functions for the case of a first-order temperature perturbation are derived from the corresponding term in the asymptotic expansion of the energy. They depend (in addition to dependence on parameters of the unperturbed atom) on two parameters derived from solution of the differential perturbation equation. These parameters differ according as the differential perturbation equation is solved under a condition of fixed atomic volume or of zero initial slope (which is computationally more convenient and corresponds to published solutions). The asymptotic forms of the parameters in the first case are determined for the two limits of an infinitesimal and an infinite atom. The boundary and initial parameters corresponding to fixed atomic volume are expressed in terms of the parameters corresponding to a solution under zero initial slope, and are evaluated in three cases from published solutions. These values are fitted by functions of the atom radius which have the proper limiting behavior for an infinitesimal and an infinite atom.

PB-166 306 Div. 20, 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOLUTION OF THE TEMPERATURE - PERTURBED THOMAS-FERMI EQUATION,
by J. J. Gilvarry. 22 Apr 54, 20p P-520-AEC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also PB-166 305.

Descriptors: (*Atoms, Thermodynamics), (*Thermodynamics, Atoms), Mathematical analysis, Perturbation theory, Low-temperature research, Statistical mechanics.

An analytic solution of the temperature-perturbed Thomas-Fermi equation of n-th order is given in terms of quadratures on the unperturbed solution corresponding to zero temperature. The boundary and initial parameters corresponding to a solution, are given as explicit integrals in terms of the unperturbed solution, on the basis of a boundary condition for fixed atomic volume. Thus, every thermodynamic function at low temperature can be written as an asymptotic series, with coefficients which can be expressed in terms of quadratures on the zero-temperature solution. In particular, the coefficients of the asymptotic series corresponding to the basic thermodynamic functions can be expressed algebraically in terms of such quadratures. These results extend and generalize a similar result due to M. G. Mayer, restricted to the first-order temperature-perturbed case. The theory is applied in detail to the first-order case. From six neutral-atom zero-temperature solutions due to Feynman, Metropolis and Teller, accurate values of the corresponding boundary and initial parameters of the first-order temperature-perturbed equation are obtained for the case of fixed atomic volume under the temperature perturbation. (Author)

21. Nuclear Propulsion

Patent 3,139,927 Div. 21, 1, 27

HEAT EXCHANGER.
Atomic Energy Commission-assigned Patent.
by Christian R. Binner and Charles W. Hammond.
7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Heat exchangers), (*Heat exchangers, Power plants (establishments), (*Nuclear power plants, Heat exchangers), (*Power plants (establishments), Heat exchangers), Jet engines, Aircraft, Nuclear propulsion.

The heat exchange apparatus is utilized in power plant assemblies. One embodiment is shown employed in conjunction with the heating of air, serving to drive a jet engine and with the heat derived from a nuclear reactor or other source. The jet engine is suitable for propelling an airplane.

22. Ordnance

Patent 3,139 795 Div. 22, 1

TANDEM LOADED FIRING TUBES.
Army-assigned Patent.
by Samuel Altschuler. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Rocket launchers), (*Aircraft ammunition, Rocket assisted projectiles), (*Rocket assisted projectiles, Aircraft ammunition), Rockets, Projectiles, Airborne, Aircraft guns.

The multi-barrel weapon is mounted on a high speed aircraft. The missile system has an extremely high rate of fire. A plurality of projectile holders are utilized and each has a plurality of projectiles dischargable in sequence. Boosted rockets are utilized in the system.

Patent 3,139,796 Div. 22, 1

GAS OPERATED FEEDER FOR GUN.
Army-assigned Patent.
by Robert G. Nutting. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Aircraft guns), (*Feed mechanisms, Aircraft guns), (*Automatic weapons, Small arms), Cartridges, Ammunition belt links.

The feeder is for use with a machine gun designed to be mounted in an aircraft having wings of narrow section. Cartridges are supplied to the gun in a belt of open links. The gun has an axially slidable bolt for chambering cartridges in a barrel and extracting the fired cases. It is provided with a feeder having a body with a throat disposed adjacent to the path of the bolt. The axis of the throat intersects the axis of the barrel at the breech end thereof.

Patent 3,139,797 Div. 22, 11

WEATHER KIT FOR MILITARY VEHICLES.
Army-assigned Patent.
by Paul A. Fair and Howard I. Huff. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vehicle accessories), (*Vehicle accessories, Protective coverings), (*Protective coverings, Vehicle accessories), Army equipment, Seats, Self-propelled guns.

One or more seats and a shelter for riders is provided on a normally seatless and topless military vehicles such as a self propelled weapon. The shelter device has an operative position on top of the vehicle and a collapsed position alongside of the vehicle.

Patent 3,140,173 Div. 22, 26

TITANIUM PRIMER FOR AN EVAPOR-ION PUMP.
AEC-assigned Patent,
by Edmond C. Hurst. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Primers), (*Primers, Titanium), (*Titanium, Primers), (*Vacuum pumps, Primers), Evaporation, Ions, Pumps, Tungsten, Porous metals, Wire, Manufacturing methods.

The primer has a uniform rate of evaporation throughout its length. It comprises a porous tungsten cake formed around a titanium wire. The titanium is melted causing it to wet and diffuse through the tungsten cake.

Patent 3,140,209 Div. 22

EXPLOSIVE INITIATOR-BOOSTER CONTAINING DIETHYLACETYLENE AND A PERCHLORATE SALT.
Air Force-assigned Patent.
by David C. Sayles. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosives initiators), (*Boosters, Explosives initiators), Silver compounds, Perchlorates, Aliphatic compounds, Propelling charges, Detonations.

The booster is used to detonate charges in projectiles. The fuse booster consists of silver perchlorate mixed with diethylacetylene in the weight proportion of 16.1 grams of silver perchlorate to 7.2 grams of diethylacetylene.

Patent 3,140,210 Div. 22

BINDER SYSTEM FOR PROPELLANTS AND EXPLOSIVES.
Navy-assigned Patent,
by Henry T. Sampson. 7 Jul 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Binders), (*Binders, Patents), (*Explosive materials, Binders), (*Propellants, Binders), Solid rocket propellant binders, Glycols, Vegetable oils, Isocyanate plastics, Organic nitrogen compounds.

The binder system is for plastic-bonded explosives and composite propellants. It consists of 30 to 40 percent by weight of castor oil, 11 to 15 percent dipropylene glycol, 20 to 30 percent of 2,4-tolylene diisocyanate and 15 to 35 percent trimethylol ethane trinitrate.

Patent 3,140,554 Div. 22

DOUBLE TANDEM-ARRANGED MAGAZINE FEEDING DEVICE.
Army-assigned Patent,
by Richard H. Colby. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Feed mechanisms), (*Feed mechanisms, Small arms), (*Gun auxiliary equipment, Feed mechanisms), Automatic weapons, Ordnance.

The feeding device is for use with shoulder arms. Two similar magazines are mounted in the firearm in tandem arrangement with the front magazine providing the primary supply of cartridges and the rear magazine the reserve supply. Cartridges are fed from the front magazine into the barrel by the bolt head. When this supply is depleted, the cartridges in the rear magazine are successively transferred to the front magazine by a feed pawl on the bolt. (Author)

Patent 3,140,659 Div. 22

METAL-COATED PROPELLANT GRANULES.
Army-assigned Patent,
by Earl F. Van Artsdalen, Joseph Quinlan, and Elwood J. Vetter. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Propellant grains), (*Propellant grains, Metal coatings), (*Metal coatings, Propellant grains), Ammunition propellants, Moistureproofing, Nickel, Small arms ammunition, Seals (Stoppers), Magnetic materials.

The coating is for the propellant granules used in a small arms cartridge such as a standard 30 caliber round. The granules are coated with a magnetic metal such as nickel to provide a moisture proof seal.

Patent 3,140,661 Div. 22, 7

GENERATOR-POWERED FUZE.
Army-assigned Patent,
by Allen S. Clarke. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Projectile fuzes), (*Projectile fuzes, Generators), (*Generators, Projectile fuzes), Power supplies, Circuits, Shafts.

The fuse is used in a projectile. The source of power is an air driven motor. The motor and a generator are mechanically interconnected for generating energy when the projectile is in flight. Circuits are provided. The elements for interconnection between the motor and generator include a shaft of non-conducting material passing through the locus of the circuit components.

Patent 3,140,685 Div. 22

PROPELLER STABILIZED AND CONTROLLED TORPEDOES.
Navy-assigned Patent,
by Thomas G. Lang. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Torpedo components), (*Torpedoes, Stabilization systems), (*Propellers (Marine), Torpedoes), Control systems.

The torpedo is stabilized by contra-rotating propellers without the use of fixed stabilizing fins. The propellers have a diameter at least the maximum diameter of the elongated hull.

Patent 3,141,246 Div. 22

SEPARABLE SIMULATED ROUND OF AMMUNITION.
Navy-assigned Patent,
by Andre Boris. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Training ammunition), (*Training ammunition, Patents), Projectiles, Cartrages cases, Simulation, Separation, Guns, Circuits, Recoil mechanisms, Hydraulic systems.

The separable round simulates the appearance and weight of a 90 mm. round. The separable round consists of two major assemblies, a projectile assembly and a cartridge assembly, each consisting of subassemblies. The system includes a gun, electrical circuitry and recoil system hydraulic circuitry.

Patent 3,141,254 Div. 22

AUXILIARY TRIGGER DEVICE WITH SAFETY.
Army-assigned Patent,
by Giulio V. Saviolo. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Firing mechanisms (Weapon)), (*Firing mechanisms (Weapon), Patents), Small arms, Gun components, Safety devices.

The auxiliary trigger device is added to a firearm so that the firearm may be fired by one wearing heavy mittens. An integral safety prevents accidental firing of the firearm unless the safety is actuated therewith. The auxiliary device includes a plurality of pivotable levers or bars which are associated with the trigger on the rifle.

Patent 3,141,326 Div. 22, 12

SAFETY AND ARMING MONITORING DEVICE.
Navy-assigned Patent,
by Lester V. Craycraft and Eugene E. Barilotti.
21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Arming devices), (*Arming devices, Patents), (*Guided missile warheads, Arming devices), Safety devices, Accelerometers, Crystals.

The safety and arming monitoring device is used in checking the safety-arming mechanism in the warhead of a guided missile. The device utilizes a crystal accelerometer for sensing the pallet clatter on the gear train, solenoid plunger bottoming and g-weight movement.

Patent 3,141,377 Div. 22

ROUND-TO-BARREL SEALING MECHANISM.
Navy-assigned Patent,
by Robert Butterworth. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gun barrel attachments), (*Gun barrel attachments, Gas seals), Gun barrels, Antiaircraft ammunition, Antiaircraft guns, Projectiles, Shipborne.

The mechanism seals a round to a gun barrel in a projectile directing and firing system. It is adapted for shipboard antiaircraft use. The mechanism includes a collar for assisting in the alignment of ammunition with the gun bore and for providing a gas seal between the ammunition and the gun tube.

Patent 3,141, 409 Div. 22

AERO FIN REMOVAL SYSTEM.
Navy-assigned Patent,
by Elmer W. Travis and Carl L. Wagner, Jr.
21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fins), (*Fins, Explosive actuators), Bomb fins, Aerodynamic control surfaces, Torpedo components, Separation, Guided bombs, Underwater-to-air, Air-to-Underwater.

The system relates to a bomb or torpedo that is fired from a submerged submarine and travels through the air to a target area where it re-enters the water to attack a submerged target. The bomb has aerodynamic guide fins that are removed by exploding a plurality of charges just prior to water entry.

Patent 3,141,434 Div. 22

TORPEDO BALLAST RELEASE.
Navy-assigned Patent,
by Lewis H. Van Billiard. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Torpedo components), (*Torpedo components, Ballast), (*Ballast, Release mechanisms), Buoyancy, Torpedoes, Recovery.

The ballast release apparatus renders a non-buoyant torpedo buoyant upon release of ballast. The apparatus makes possible the recovery of a torpedo after a test run. The apparatus includes a ballast weight, a rotatable screw for effecting release of the weight, a spring motor, and a latch or release for initiating the operation of the motor.

23. Personnel and Training

No Entries

24. Photography and Other Reproduction Processes

Patent 3,141,727 Div. 24

FILM-STRIP DENSITY CURVE PLOTTING DEVICE.
Navy-assigned Patent,
by Harry L. Devereaux, Jr. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Film readers), (*Film readers, Control systems), Densimeters, Photoelectric effect, Photographic analysis.

The film-strip feeding and plotting pen control device feeds a film-strip through a photoelectric densitometer and controls a plotting of a film-strip and a film-strip's density. The film-strip drive unit for a manual photoelectric densitometer increases the number of film-strips that can be read by a single densitometer in a given period of time.

25. Physics

CAPE-980 Div. 25

Lawrence Radiation Lab., Univ. of California, Livermore.
ALICE 'B' 60 kv SOURCE 6 INCH ELBOW TRAP.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Vacuum systems, Specifications), Diffusion pumps, Gaskets, Thermal insulation.

The package contains 1 drawing. The ultra-high vacuum trap consistently produces pressures of 1 x 10 to the -10 power Torr and at times 1 x 10 to the -11 power Torr. It has an optically opaque, two-bounce baffle, an oil migration barrier, aluminum foil gaskets, minimum heat leaks to the baffle and to the liquid-nitrogen ports, and an elbow baffle to prevent the cold baffle from 'seeing' the mouth of the diffusion pump. It is bakeable to 400C and is easily disassembled for cleaning. The traps are used with commercially available 6-in. oil diffusion pumps. (AEC abstract)

CAPE-981 Div. 25

Lawrence Radiation Lab., Univ. of California, Livermore.

MOLECULAR BEAM EXPERIMENT VERTICAL CIRCULATING LN-BAFFLE, 4 IN.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Vacuum systems, Specifications), (*Molecular beams, Vacuum systems), Diffusion pumps, Gaskets, Thermal insulation.

The package contains 1 drawing. The baffle is used with a 4 in. oil diffusion pump in a molecular beam experiment to produce pressures as low as 1 x 10 to the -10 power Torr. The optically opaque, two-bounce baffle has the following features: an oil migration barrier, aluminum foil gaskets, minimized heat leak to the baffle and to the liquid-nitrogen ports, a vacuum insulation neck for the nitrogen transfer lines, and a diffusion pump port cover which can be closed during start-up of the pump thereby preventing slugs of oil from hitting the cold baffle. The baffle is bakeable to 400C and is easily disassembled for cleaning. (AEC abstract)

Patent 3,141,826 Div. 25

APPARATUS AND METHOD FOR CONFINING A PLASMA.
AEC-assigned Patent,
by Kurt O. Griedrichs and Harold Grad. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Plasma physics), (*Plasma medium, Magnetic pinch), Magnetic fields, Configuration, Surfaces, Electrical conductance.

The apparatus establishes a finite plasma-magnetic field configuration in which the plasma is separated from the magnetic field by cusped surfaces. Features include a magnetic field in the plasma to reduce particle losses through the cusps between the surfaces. A current carrying conductor in the plasma increases the magnetic efficiency.

Patent 3,142,034 Div. 25

ELASTIC WAVE RADIATOR AND DETECTOR.
Navy-assigned Patent,
by Miguel C. Junger. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Acoustic detectors), (*Acoustic detectors, Mechanical waves), (*Mechanical waves, Detectors), Transducers.

The apparatus is for use in elastic wave radiation and receiving systems. A transducer is utilized which has an aperture which is so small compared to the wavelength of elastic wave energy in a fluid medium at any given frequency as to constitute, in effect, a point or omnidirectional source, to be directively coupled to a very high degree with a water or other fluid medium. The transducer is coupled to one end of an elongated conductor of elastic wave energy. If water is the medium into or from which such energy is to be coupled from or to the transducer, the elongated conductor is chosen or designed to propagate in the axial direction, at a velocity equal to or greater than the velocity of compressional wave energy in the water, elastic waves in a mode which will couple with the water through the sides of the conductor. (Author)

PB-166 292 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOLUTIONS OF THE TEMPERATURE-PERTURBED THOMAS-FERMI EQUATION,
by J. J. Gilvarry and G. H. Peebles. 5 Nov 54, 16p P-591-AEC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Atomic structure, Thermodynamics), Atomic orbitals, Perturbation theory, Functions, Equations of state.

Previous numerical results are extended by using an analytical solution of the temperature-perturbed Thomas-Fermi equation to obtain boundary and initial parameters corresponding to seven neutral-atom zero-temperature solutions given by Slater and Krutter. Fitted functions given previously for the solution parameters in terms of the unperturbed atom radius are revised to include the new data, to obtain a considerable extension in directly-fitted range. Effects of the temperature perturbation on the equation of state are shown graphically for the extended range. (Author)

PB-166 293 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE LINDEMANN AND GRUNEISEN LAWS,
by J. J. Gilvarry. 23 Mar 55, 36p P-644-AEC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Melting, Theory), (*Metallic crystals, Phase studies), (*Crystal lattices, Phase studies), Transition temperature, Atomic properties, Chemical bonds, Vibration, Harmonic oscillators, Crystal structure, X-ray diffraction analysis, Thermodynamics.

The Lindemann assumption of direct contact of neighboring atoms at fusion is replaced by the criterion that melting occurs when the root-mean-square amplitude of thermal vibration reaches a critical fraction RHO, presumed the same for all isotropic monatomic solids, of the distance of separation of nearest-neighbor atoms. The Debye-Waller theory of the temperature dependence of the intensity of Bragg reflection of X-rays is used, without further assumptions, to derive a generalized Lindemann law. If the Gruneisen constant gamma-m of the solid at fusion is evaluated by its definition from the Debye frequency of the solid, use of the generalized Lindemann law and Clapeyron's equation permits one to express gamma-m in terms of the bulk modulus of the solid at melting and the latent heat and volume change of fusion. Experimental fusion data on 13 cubic metals are used to evaluate the constant of proportionality (inversely proportional to RHO) in the Lindemann frequency; the values are reasonably constant. The average RHO seems significantly below values estimated by Gruneisen. Good agreement with the cubic metals is found for hexagonal close-packed elements, but not for elements with more complex lattices, in general. (Author)

PB-166 294 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THERMODYNAMIC PROPERTIES OF MIXTURES ON THE STATISTICAL MODEL,
by J. J. Gilvarry and W. G. McMillan. 28 Aug 56, 8p P-297-AEC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thermodynamics, Statistical processes), (*Nuclear models, Thermodynamics), Equations, Electrons, Atoms, Nuclei, Electric fields, Statistical functions, Electrostatics.

A new method of deriving Brachman's results for the thermodynamic functions of the Thomas-Fermi atom is given in a generalized form applicable to mixtures of electrons and light nuclei in the field of a heavy nucleus. (Author)

PB-166 295 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE CORRELATION ENERGY OF AN ELECTRON GAS AT HIGH DENSITY,
by Murray Gell-Mann and Keith A. Brueckner.
29 Nov 56, 18p P-985-AEC

Unclassified report

Prepared under Subcontract SC-101 with the Reagents of the University of California (Radiation Lab., Univ. of California, Berkeley) and U. S. Atomic Energy Commission Contract AT29 1 1477.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electrons, Plasma medium), (*Plasma physics, Electrons), (*Gases, Atomic energy levels), Theory, Ground state, Density, Perturbation theory, Energy, Differential equations, Integral equations.

The quantity E sub c is defined as the correlation energy per particle of an electron gas expressed in Rydbsrgs. It is a function of the conventional dimensionless parameter r sub s where .001 x r sub s is proportional to the electron density. Here E sub c is computed for small values of r sub s (high density) and found to be given by E sub c = A n r sub s + C + theta prime ($\tilde{r}$ sub s). The value of A is found to be .0622. An exact formula for the constant C is given here for the first time; earlier workers had made only approximate calculations of C. Further, it is shown how the next correction in r sub s can be computed. The method is based on summing the most highly divergent terms of the perturbation series under the integral sign to give a convergent result. The summation is performed by a technique similar to Feynman's methods in field theory. (Author)

PB-166 296 Div. 25, 17
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE COMPRESSIBILITIES OF SIMPLE METALS,
by W. G. McMillan and A. L. Latter. 6 May 57,
10p P-1073-AEC

Unclassified report

Prepared under contract with U. S. Atomic Energy Commission Contract AT11 1 135.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Metals, Equations of state), (*Equations of state, Metals), Theorems, Thermodynamics, Valence, Electrons, Heat of formation, Alkali metals, Alkaline earth metals, Transition elements, Ions, Gases, Transport properties, Compressive properties, Density, Molecular properties.

An isothermal equation of state is derived from the coulomb virial theorem for 'simple' metals consisting of imperturbable (i.e., invariant) kernels embedded in a uniform sea of valence (e.g., s) electrons. Comparison with experiment at room temperature gives good agreement for the alkali and alkaline earth metals, but is understandably erratic for other groups. The compressibility is simply related to the heat of formation of the normal gaseous ion kernel. (Author)

PB-166 311 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PHOTOELECTRIC K AND L SHELL ABSORPTION COEFFICIENTS FOR HIGHLY IONIZED ATOMS,
by S. A. Moszkowski and R. E. Meyerott.
29 May 56, 10p P-872-AEC
Contract AT29 1 1477

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Atomic orbitals, Absorption spectrum), Atomic spectroscopy, Photoelectric effect, Ions, Plasma medium.

The paper deals with absorption coefficients averaged over subshells for the K and L shells of atoms and ions. The absorption coefficient is expressed in terms of an effective charge which is evaluated with the use of coefficients given in a previous paper. The effective charge is also expressed in terms of an effective screening constant which is useful in certain limiting cases. A comparison is made between the various methods of computation and their reliability is discussed. (Author)

PB-166 312 Div. 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE GRUNEISEN PARAMETER FOR AN EINSTEIN SOLID AND UNDER FINITE STRAIN,
by J. J. Gilvarry. 26 Sep 55, 28p
P-747-AEC; RM-1556-AEC
Contract W7405eng48
AECU 3111

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Equations of state, Solids), (*Solids, Strain (Mechanics)), Stresses, Compressive properties, Thermodynamics, Elasticity, Harmonic analysis, Hydrostatic pressure.

The Gruneisen parameter (or constant), as evaluated from the equation of state, was obtained for an Einstein solid by a method analogous to that used by Einstein and Madelung to express the Einstein frequency in terms of elastic constants. The result differs (by - 1/3) from the corresponding evaluation on the Debye theory, as given by Lorentz and Slater. This fact explains a number of apparent inconsistencies in the literature, where the limitation to either an Einstein or a Debye solid has been tacit. In particular, it resolves a paradox raised by Dugdale and MacDonald in connection with an ideal harmonic solid, and ascribed by them to neglect of finite strain. The presence of a state of finite hydrostatic pressure, upon which elastic waves or pressure changes of infinitesimal amplitude are impressed, is taken into account explicitly by means of Murnaghan's theory of finite strain, to obtain the Gruneisen parameters as evaluated from the equation of state, on the Debye and Einstein models. The results are identical in the two cases with the corresponding values obtained without use of the formal theory of finite strain.

PB-166 376 Div. 25, 22
OTS Prices: HC $1.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
THE TEMPERATURE OF SHOCK WAVES IN SOLIDS.

Technical rept.,
by G. B. Benedek. 20 Jan 60, 16p Cruft-TR-316
Contract Nonr1866 16, Proj. NR372 012
AD 235 695

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Shock waves, Temperature), Thermodynamics, Mathematical analysis, Vibration, Energy, Aluminum, Differential equations, Solids.

A theory is presented which enables a relatively simple calculation of the temperature rise in a solid undergoing shock-wave compression. The method first makes use of a previous determination of the volume dependence of the cohesive energy to obtain the increase in vibrational energy on shock compression. The increase in vibrational energy is then analyzed using the Debye model to obtain the associated rise in temperature. Explicit calculations were carried out for aluminum, providing results which are in good agreement with the thermodynamic calculations which were previously made. (Author)

PB-166 388 Div. 25, 32
OTS Prices: HC $5.00/MF $1.00

American Inst. of Physics, New York.
THE JOURNAL LITERATURE OF PHYSICS. A COMPREHENSIVE STUDY BASED ON PHYSICS ABSTRACTS (SCIENCE ABSTRACTS, SECTION A) 1961 ISSUES,
by Stella Keenan and Pauline Atherton. 1964, 164p
AIP/DRP PA1(1964)

Unclassified report

Descriptors: (*Physics, Reports), (*Reports, Distribution), Statistical analysis, Bibliographies, Abstracting, Indexes, Subject indexing, Classification.

A comprehensive study of the publication of physics literature was made by analyzing the 1961 issues of Physics Abstracts. Information on 405 journals from 39 countries - a total of 20,287 articles - was collected. For each journal article, details about the year of publication, number of authors, language of article, type of abstract in Physics Abstracts, and placement in subject categories in Physics Abstracts are now available in machine readable form. These data are used to rank journals and countries in order of contribution to Physics Abstracts as a whole and to each subject field within physics. A profile for each country and for each journal, in terms of its coverage in Physics Abstracts, is presented in tabular form. The distribution of the subject content of physics journal literature throughout the world is also shown. (Author)

26. Production and Management

CAPE-541 Div. 26

Sandia Corp., Albuquerque, N. Mex.
CONNECTOR TOOL.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Small tools, Specifications), Material removal, Electric connectors, Springs.

The package contains 3 drawings and 1 photograph. The tool was developed to facilitate removal of contacts from the bodies of removable contact connectors for modification or reuse. The tool is a spring-loaded device with which contacts can be removed by a simple action from one side of the connector. (AEC abstract)

CAPE-1067 Div. 26

General Electric Co., Hanford Atomic Products Operation, Richland, Wash.
MECHANICAL MANIPULATOR FOR VACUUM SYSTEM.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Remote control systems, Specifications), (*Vacuum systems, Remote control systems), Welding, Electron beams, Clamps.

The package contains 4 drawings. The mechanical manipulator is used with a vacuum chamber for electron beam welding. The manipulator consists of an aluminum pistol grip and a steel rod housing. This tube contains the drive rod. It enters the chamber by a ball and socket. The steel ball is held by a brass ball retainer. The clamp assembly is 10 in. long and opens to 3 in. (AEC abstract)

Patent 3,139,663 Div. 26, 13

CONCRETE CASTING MACHINE.
Army-assigned Patent,
by Joseph I. Boswell, Tilden Burks, George F. Dixon, Jr., and Goode S. Lee. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Casting), (*Concrete, Casting), (*Casting, Machines), (*Machines, Concrete), Automation, Conveyors, Erosion.

The machine is for casting, on a production line basis, articulated concrete revetment mats employed to protect riverbanks and flood control levees from hydraulic erosion. The apparatus includes a moving conveyor system which carries flat pallets to a casting station where a concrete casting is formed on each pallet. The pallets are then transported through a curing kiln and from thence to a casting removal station. Each pallet is then cleaned, a wire fabric is placed on the pallet, oil is dripped onto the pallet and the pallet moves on again to the forming station.

Patent 3,139,680 Div. 26, 7

METHOD OF BONDING CONTACTS TO THERMOELECTRIC BODIES.
Navy-assigned Patent,
by Samuel J. Scuro. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Bonding), (*Electric connectors, Heating elements), (*Heating elements, Bonding), Copper coatings, Steel, Zinc, Antimony alloys, Thermoelectricity.

A mechanically strong low electrical resistance bond is provided between a copper clad steel contact element and zinc antimonide thermoelectric element. The bond is accomplished by direct fusion of the thermoelectric material to the electrical contact.

Patent 3,140,108 Div. 26, 17

PROCESS AND PRODUCT OF METALLURGICALLY JOINING ZIRCONIUM TO FERROUS METAL.
AEC-assigned Patent,

by Joseph L. Klein, Albert R. Kaufmann, and Paul Loewenstein. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Metal joints), (*Metal joints, Joining), Hot working, Zirconium, Iron, Rods, Pipes, Nuclear reactors.

The process provides a joint particularly suited for buttwise connection of pairs of members both similarly in the form of rods, tubes, or the like of uniform axial cross section. It is useful in the nuclear reactor art. The process involves a hot extrusion step.

Patent 3,140,567 Div. 26

LENS CENTERING AND BEVELING MACHINE.
Army-assigned Patent,
by William E. Soong, Robert E. Miller, James Des Jardins, and Lawrence H. Sharper. 14 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Lenses), (*Lenses, Material forming), Grinders, Machines, Positioning devices (Machinery), Automatic, Circuits.

The machine operates continuously to recieve a series of blank lenses and functions automatically to center each lens and pass it through grinding stations. The machine includes a number of spindle pairs each including a lower spindle fixed to an index table and an upper spindle biased into engagement with the lower spindle. An arrangement is shown for raising the upper spindles. Electrical circuitry is used for control of the operations.

Patent 3,140,728 Div. 26

HIGH PRESSURE FOUR-WAY VALVE.
NASA-assigned Patent,
by William F. MacGlashen, Jr., and Harry J. Margraf. 14 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, High-pressure valves), (*High-pressure valves, Multiple operation), Valves, Fluid flow, Rings, Ducts.

The high pressure valve has a bore through it and an inlet port in the form of an annular channel. A valve armature is slidable in the valve body. The armature defines an annular O-ring groove and has flanking lands slidably fitting the bore. The lands have axial dimensions greater than the inlet port. An O-ring in the groove is adapted to pass across the inlet port while the lands restrict flow therethrough.

Patent 3,141,366 Div. 26

TOOL HOLDER AND MOUNT.
Army-assigned Patent,
by Milton A. Frank, Sr. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Positioning devices (Machinery)), (*Positioning devices (Machinery), Lathe tools), (*Lathe tools, Positioning devices (Machinery), Lathes, Supports, Jigs, Machine tools.

The combination tool holder and tool mount is for use on a lathe which includes a spindle carrying a work holder. The tool mount is mounted and bored so that the axis of a cylindrical tool holder intersects the dead center line through the spindle and tail stock, and the plane formed by these lines is parallel to the lathe bed.

Patent 3,141,484 Div. 26, 32

PEA PIERCING MACHINE.
Agriculture-assigned Patent,
by Edison Lowe and Everett L. Durkee. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Machines), (*Machines, Penetration), (*Penetration, Vegetables), Food, Pressure, Fluids, Ejection, Processing.

The apparatus is for piercing peas or other food products. A rotatable hollow drum has a plurality of pea-receiving cavities on the surface of the drum. Each cavity has a pea piercing element. A reduced fluid pressure is used to draw a pea into each cavity. After the peas are pierced an elevated fluid pressure ejects them from the cavities.

Patent 3,141,632 Div. 26, 7

COIL WINDING FORM.
Army-assigned Patent,
by Daniel C. Spitz. 21 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Winding), (*Winding, Coil (*Coils, Winding), Halocarbon plastics, Shafts, Flanges, Metal plates.

The form is for winding coils of various sizes. The winding apparatus includes an axle, a spindle, a pair of flanges, a pair of disc-shaped plates. The spindle and the flanges are formed of Teflon.

27. Propulsion Systems

Patent 3,139,725 Div. 27, 12

STEERABLE SOLID PROPELLANT ROCKET MOTOR.
National Aeronautics and Space Administration-assigned Patent.
by Carl W. Raggio, Jr. 7 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Rocket motors (Solid propellant)), (*Rocket motors (Solid propellant), Controllable-thrust rocket motors), (*Controllable-thrust rocket motors, Rocket motors (Solid propellant)), Valves, Rocket motors nozzles.

The steerable solid propellant rocket motor is provided with laterally directed steering nozzles and valves for remote control so that laterally directed thrusts may be made during operation of the motor to guide it and the vehicle attached thereto.

Patent 3,139,750 Div. 27, 30

HYDRAULIC FORCE BALANCE APPARATUS.
Navy-assigned Patent.
by Max R. Smith and Melvin D. Howell. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test equipment), (*Controllable-thrust rocket motor, Test equipment), (*Rocket motors, Test equipment), Rocket laboratories, Hydraulic systems, Valves.

The apparatus is for testing the variable axial thrust of a rocket motor. Apparatus is shown in which rapidly changing forces are maintained balanced by hydraulic pressure. A two valve control system is used for automatically balancing the variable force with hydraulic pressure.

Patent 3,141,238 Div. 27, 14, 26

METHOD OF LOW TEMPERATURE BONDING FOR SUBSEQUENT HIGH TEMPERATURE USE.
Commerce-assigned Patent,
by George G. Harman, Jr. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Bonding), (*Bonding, Heat-resistant materials), Metal joints, Gallium alloys, Gold alloys, Copper alloys, Nickel alloys, Silver alloys, Cobalt alloys.

Metal is bonded by placing a bonding agent between the surfaces to be bonded. The bonding agent consists of a mixture of gallium and at least one other metal such as gold, copper, nickel, silver and cobalt. The surfaces are pressed together and held together at a temperature at or slightly above the melting point of gallium until the agent forms an alloy and hardens. Any metals which alloy with the liquid constituent can be bonded.

28. Psychology and Human Engineering

No Entries

29. Quartermaster Equipment and Supplies

Patent 3,139,622 Div. 29, 12

MOON CAPSULE SUIT.
Air Force-assigned Patent.
by Otto Schueller. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective clothing), (*Lunar environment, Protective clothing), (*Protective clothing, Lunar environment), Pressure suits, Shielding, Radiation.

The moon capsule suit includes a pressurized capsule and an emergency mechanical pressure suit in which is enclosed the prospective space man. The capsule incorporates a door which includes radiator blinds which are manually adjustable. A combined solar power source and umbrella are positioned adjacent the upper portion of the capsule. The umbrella is combined with a support for giving further protection to the space man.

Patent Design 198,716 Div. 29

FACE MASK FOR A HELMET.
Navy-assigned Patent,
by Russell S. Colley. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective masks), (*Protective masks, Helmets), Design.

The ornamental design is for the face mask for a helmet. The mask appears to be designed to cover the entire head of the wearer. A pivoted front piece covers the front part of the wearer's face. The feature resides in the pattern of ornamnetation applied to the front piece which consists of connected vertical lines drawn on the front of the mask.

Patent Design 198,717 Div. 29, 3

FACE MASK FOR A HELMET.
Navy-assigned Patent,
by Russell S. Colley. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective masks), (*Protective masks, Helmets), Design.

The ornamental design is for the face mask for a helmet. The mask appears to be designed to cover the entire head of the wearer. A pivoted front piece covers the front part of the wearer's face. The feature resides in the pattern of ornamentation applied to the front piece which consists of connected lines drawn at an acute angle.

Patent Design 198,718 Div. 29

FACE MASK FOR A HELMET.
Navy-assigned Patent design,
by Russell S. Colley. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective masks), (*Protective masks, Helmets), Design.

The ornamental design is for the face mask for a helmet. The mask appears to be designed to cover the entire head of the wearer. A pivoted front piece covers the front part of the wearer's face. The feature resides in the pattern of ornamentation applied to the front piece which consists of connected lines drawn at acute angles at the top and bottom of the front piece.

30. Research and Research Equipment

CAPE-598 Div. 30

Lawrence Radiation Lab., Univ. of California, Livermore.
SHEFFIELD ROTARY CONTOUR GAGE.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Meters, Thickness), (*Test equipment, Machine shop practice), Interferometers, Design, Reliability, Machine tools, Instrumentation.

The contour gage has an accuracy of 50-150 microinches on wall thickness and 100-300 microinches on radial distance. Run time is about 45 min for 45 points. The gage has 4 coordinate motions, a 90 degree angle theta, a 360 degrees rotary angle phi, a radius setting 'R,' and a thickness setting 'T.' The radius and thickness slides are counter-weighted and have two inches of slide travel controlled by large diameter micrometer heads. Differential transformer gage heads show deviation from true position on radial distance and wall thickness. The gage may be used with a fringe counting interferometer as the ultimate displacement transducer as fringe counting lends itself to the two-inch slide travel of this gage. Combining a Sheffield Rotary Contour Gage, an interferometer, and a tape control servo system may provide a system that would make an inspection gage, of the speed and accuracy needed for modern machine tools. Twenty-nine drawings are included. (AEC abstract)

CAPE-1069 Div. 30, 20

Argonne National Lab., Lemont, Ill.
DENSITY BALANCE WITH HOOD.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Balances, Specifications), (*Density, Measurement), Nuclear physics laboratories, Remote control systems, Ventilation ducts.

The package contains 32 drawings. The remotely controlled, hot laboratory equipment consists of a standard balance and a specially designed density measuring apparatus. Density measurements are obtained by immersing a specimen in a liquid-filled Dewar flask. The flask is unsilvered and has a capacity of 7200 ml. The critical parts of the weighing apparatus are enclosed in a hood to prevent air currents from affecting the weighing operation. The Mettler balance is enclosed in a hood, which rests on top of the other hood. Metal frames and lucite or metal panels are used. The apparatus is used in an alpha-gamma cave. (AEC abstract)

CAPE-1073 Div. 30, 9

Sandia Corp, Albuquerque, N. Mex.
HYPERSONIC WIND TUNNEL COMPONENT DESIGN.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Hypersonic wind tunnels, Specifications), Gas seals, Valves, Suspension devices, Refractory materials, Heaters.

The package contains 4 drawings. The hypersonic 18-in. wind tunnel is an intermittent, vacuum-receiver exhaust, blowdown-type with a test section 18 in. in dia and 48 in. long. The tunnel's scale model testing capabilities are: surface pressure distribution, 2 to 6 component force, free oscillation dynamic stability, and model surface heat-transfer rate. The maximum model size that the tunnel can accommodate is 4 in. in dia. The components are the pressure seal for the 16-in. dia slide valve, balance cell assembly, suspension and translation system, and the refractory installation in the 90-in. pebble bed heater. (AEC abstract)

CAPE-1082 Div. 30, 8

Los Alamos Scientific Lab., N. Mex.
NET-1 NETWORK ANALYSIS PROGRAM.
Engineering materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Computers, Circuits), (*Circuits, Statistical analysis), Transistors, Diodes (Semiconductor), Power supplies, Resistors, Capacitors, Transients, Programming (Computers).

The package consists of 19 flow charts to be used for the MANIAC II Computer to simulate the d-c steady state behavior of a large class of electrical circuits, which may contain passive and solid-state components. Circuits described to NET for analysis may include the following elements connected in any manner so long as the connections reman fixed: junction transistors and diodes; signal and fixed voltage sources; and fixed-value resistors, capacitors, inductors, and mutual inductive couplings. The NET program makes it possible to determine variations of circuit response due to changes in circuit parameters. Destructive transient phenomena may be studied with no fear of destroying expensive transistors. (AEC abstract)

CAPE-1103 Div. 30

Southern Research Inst., Birmingham, Ala.
STRESS-STRAIN FACILITY EQUIPMENT.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Test facilities, Specifications), (*Test equipment, Mechanical properties), Stresses, Strain (Mechanics), Brittleness, Loading (Mechanics), Compressive properties, Thermal properties, Furnaces, Materials.

Seven photographs and 97 drawings of a facility to determine the stress-strain properties of brittle materials are included. Other properties of brittle materials were explored including compression, shear, Poisson's ratio, and thermal properties. Special equipment was developed for the facility, which included: a radiant heating source for raising the temperatures of specimens to 5200F; gas-bearing universals to accomplish uniaxial loading; a tensile load frame; an optical strain analyzer with fully automatic and continuous recording; a mechanical drive system; and a load train. The heating source is a resistance element furnace with a hot zone 2 in. ID and 2 1/2 in. long. Later modifications of the furnace included pressurization with helium, which permitted performance to temperatures of 6500F (AEC abstract).

CAPE-1107 Div. 30

Oak Ridge National Lab., Tenn.
ZONAL CENTRIFUGE, B-II.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Centrifuges, Specifications), Laboratory equipment, Mechanical drawings, Ribosomes, Separation, Bacteria, Viruses.

The 26 drawings in this package are for an intermediate-speed centrifuge designated B-II. It is designed for operation at 40,000 rpm. There are a number of rotor cores used with the B-II system. The B-IV1, B-IV2, B-V, B-VI, B-VII, and B-VIII rotor cores are included. The B-IV core has been used successfully to separate quantities of ribosomes and ribosomal subunits from cell extracts. The B-V core is effective in rate-zonal separation of large particulates from bacterial protoplasts. Drawings are included for flat-face seals using a Rulon runner and a hardened 440 stainless steel runner. The entire seal is enclosed to provide a buffer cavity for a disinfectant to inactivate any virus particles that may leak out between the seal faces. (AEC abstract)

Patent 3,139,653 Div. 30, 17

APPARATUS FOR THE GROWTH OF PREFERENTIALLY ORIENTED SINGLE CRYSTALS OF METALS.
Commerce-assigned Patent.
by Theodore H. Orem. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Laboratory equipment), (*Laboratory furnaces, Single crystals), (*Single crystals, Metals), (*Crystal growth, Laboratory equipment).

The apparatus is for growing monocrystals of metals which are used in fundamental research on metals. The monocrystals of the metals may have any desired axial orientation and be of any external configuration. The apparatus includes a vertical furnace, a vertical mold having a matrix for a specimen and a vertical seed receptacle. The mold and seed receptacle are rotatable relative to each other about the vertical.

Patent 3,139,756 Div. 30, 1, 22

CARTRIDGE OPERATED DEVICE TESTER.
Army-assigned Patent.
by Creston F. Laager. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test equipment), (*Test equipment, Cartridges (Pad)), (*Cartridges (Pad), Test equipment), Aircraft canopies, Catapults, Jet planes.

The mechanism is for testing of cartridge actuated devices and is operated to simulate the conditions under which the tested device is to be operated. The cartridge actuated devices are used to operate catapults, canopy removers and escape systems for disabled jet aircraft. The tester subjects the tested device to a load equivalent to that required in actual use and makes available a record useful in the determination of the rate of change of velocity and other data.

Patent 3,140,341 Div. 30

MIRROR POSITIONING APPARATUS.
Navy-assigned Patent,
by Pliny G. Holt. 7 Jul 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Photographic projectors), (*Positioning devices (Machinery), Mirrors), (*Photographic projectors, Positioning devices (Machinery)), Display systems, Submarines, Aircraft, Optical images.

The mirror positioning apparatus is for use in a light projector system by which a plurality of images optically projected on a screen can be independently or concomitantly moved thereon. It is used in optical displays found on submarines and aircraft for pictorial representations.

Patent 3,140,479 Div. 30, 8, 25

TRANSISTORIZED ANALOG-TO-DIGITAL CONVERTER.
AEC-assigned Patent,
by Robert L. Chase. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Analog-to-digital converters), (*Analog-to-digital converters, Semiconductor devices), Input-output devices, Circuits, Transistors, Data processing systems.

The pulse height-to-time conversion circuit employs semi-conductor type active elements to reduce the physical size and power consumption of the circuit. The transistors are utilized in paired arrangements. (Author)

Patent 3,141,340 Div. 30, 12

GRAVITY DEVICE.
NASA-assigned Patent,
by Josef Boehm. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Instrumentation), (*Spacecraft, Acceleration), (*Gravity, Acceleration), Phototubes, Electromagnets, Spheres, Lighting equipment.

The gravity device is carried in a space vehicle for the study of instrumentation. It is constructed having an elongated passageway and a ball therein which is adapted to accelerate undisturbed within the passageway in response to gravitational force. The device also includes a light source and photoelectric cell for detecting the exact position of the ball within the elongated passageway. To make certain where the initial position of the ball is located, an electromagnet is provided in one example at an end of the elongated passageway and in another example midway of the length of the passageway.

PB-166 352 Div. 30
OTS Prices: HC $1.00/MF $0.50

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
THE DEVELOPMENT OF HIGH TEMPERATURE THERMOCOUPLES.
Report memo. no. 4, 20 Mar-19 Apr 48,
by Gary Steven, R. M. Curcio, and Walter Troy.
23 Apr 48, 6p NEPA-553-ARM-5
Proj. 90 565B
AD 206 719
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thermocouples, Stabilization), (*High-temperature research, Thermocouples), Tungsten, Molybdenum, Heat treatment, Calibration, Pyrometers, Heating elements, Furnaces.

An attempt was made to stabilize the tungsten-molybdenum couple by annealing at 2000C for subsequent recalibration against a Leeds and Northrup high temperature optical pyrometer. A new molybdenum wound resistance furnace was constructed, incorporating improvements in design deemed necessary from the frequent shorting out of the heating elements in the furnace.

PB-166 353 Div. 30
OTS Prices: HC $1.00/MF $0.50

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
THE DEVELOPMENT OF THERMOCOUPLES.
Report memo no. 3, 18 Feb-18 Mar 48.
23 Mar 48, 12p NEPA-552-ARM-4
Proj. 90 565B
AD 206 720

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thermocouples, Feasibility studies), Temperature sensitive elements, Tungsten, Molybdenum, Wire, Welds, High-temperature research, Calibration.

The work carried out was mainly in the calibration of the tungsten-molybdenum couple. The e.m.f.-temperature curves for the tungsten-molybdenum couple was previously determined. It was shown that this couple produced very low e.m.f. values and also that a reversal took place at about 1450C. Since the couple is not very sensitive to small temperature changes and because of the shape of the curve, the couple does not appear to have any real practical value. It was decided, however, to use this thermocouple in order to set-up the calibration equipment in the laboratory and to determine if the couple could be used at the high temperatures as a possible secondary standard.

PB-166 360 Div. 30, 2
OTS Prices: HC $1.00/MF $0.50

Weather Bureau, Washington, D. C.
A CONTROLLED HUMIDITY CHAMBER,
by Charles B. Haegele and Donald A. Mathews.
1 Apr 64, 14p IED-5

Unclassified report

Descriptors: (*Humidity cabinets, Test equipment), (*Test equipment, Humidity cabinets), Hygrometers, Humidity, Dew point, Electrical equipment, Design, Radiosondes, Mechanical drawings, Salts, Solutions, Materials, Symposia, Meteorological instruments.

A transparent humidity chamber for testing humidity and dewpoint sensors was displayed at the International Symposium on Humidity and Moisture held in Washington, D. C., in May of 1963. The chamber is approximately a 14-inch cube. The dimensions may be varied, using the illustrations as guides, to fit individual requirements. Total cost of materials for the chamber, including motor, blower, and psychrometer, is less than $100. The humidity chamber contains an upper compartment for testing humidity sensors and a lower compartment for a tray of saturated salt solution. The salt tray compartment has a hinged door to permit the changing of trays. The wall between the two compartments is fitted with two gasketed air gates that may be controlled from the exterior to prevent room relative humidity from entering the sensor-test compartment during salt tray changes. Sponge-rubber gaskets are sufficient to seal openings as the pressure requirements are low. Transparent plastic is used in this design so that water droplets, sprayed into the chamber during wetting tests, can be visually followed. The motor-driven blower circulates the air within the chamber and ventilates the psychrometer.

PB-166 390 Div. 30
OTS Prices: HC $1.00/MF $0.50

Digital Systems Lab., Princeton Univ., N. J.
REDUCING VARIABLE DEPENDENCY IN COMBINATIONAL CIRCUITS.
Technical rept.,
by A. J. Bernstein. Jul 64, 10p PU-DSL-37

Unclassified report

Descriptors: (*Special functions (Mathematical), Computer logic), (*Circuits, Input-output devices), (*Computer logic, Special functions (Mathematical)), Digital computers.

The problem of encoding inputs to an n-input, 2-output combinational circuit so as to reduce the number of variables upon which the two output functions depend is considered in this paper. It is assumed that the number of input conditions (n-vectors) which must produce each output state is given. It is clear that for each mapping of n-vectors into output states a different pair of output functions will be specified. The objective of this work is to find that pair of output functions which is independent of as many of the input variables as possible. The problem is first considered for the case where all 2(n) input conditions are specified. The solution obtained here is later generalized to allow for don't care conditions. The generalization of the problem to m output functions is also discussed. (Author)

31. Ships and Marine Equipment

No Entries

32. Miscellaneous Arts and Sciences

Patent 3,140,800 Div. 32

DISPENSER FOR GRANULAR MATERIALS.
Agriculture-assigned Patent,
by Charles F. Henderson. 14 Jul 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Containers), (*Containers, Powders), (*Powders, Distribution), Agriculture, Insecticides, Herbicides, Fertilizers, Plants, (Botany), Vibrators (Mechanical), Portable.

The device is for dispensing measured quantities of agricultural insecticides, herbicides and fertilizers on low-growing plants in a manner simulating airplane application. The supply container is carried at the end of

a pole and other elements are carried by a harness attached to a man's back. The material is dispensed in desired quantities by an electric vibrator which vibrates the supply container.

PB-166 368 Div. 32, 12
OTS Prices: HC $2.00/MF $0.50

Bureau of Yards and Docks, Washington, D. C.
BUREAU OF YARDS AND DOCKS STANDARDS FOR THE PREPARATION AND SUBMISSION OF ARTWORK.
Aug 61, 22p
NAVDOCKS P 345

Unclassified report

Descriptors: (*Military publications, Standards), Pictures, Preparation, Photographs.

These standards cover the requirements for the preparation and submission of illustrations to be used for final reproduction in publications of the Bureau of Yards and Docks. The standards do not apply to illustrations used in review copies of preliminary drafts, which may include photostats, vandykes, blue or brown-line prints, or other prints made by similar reproduction processes. (Author)

PB-166 387 Div. 32
OTS Prices: HC $3.00/MF $0.75

American Inst. of Physics, New York.
INDEX TO SCIENTIFIC JOURNAL TITLE ABBREVIATIONS FOUND IN THE PHYSICAL REVIEW,
comp. by Phyllis A. Richmond. 1964, 84p
AIP/DRP-64-4

Unclassified report

Prepared in cooperation with Rochester Univ., N. Y.

Descriptors: (*Indexes, Periodicals), (*Periodicals, Scientific research), (*Libraries, Indexes), Documentation, Reports, Information retrieval, Identification.

The journal title abbreviations which appeared in the footnote references in The Physical Review 1948-58 were collected. Expansions for the 655 abbreviations which could be identified were provided in a form useful for finding the journals in a library. Differentiation among journals with like abbreviated citation forms was difficult. Accurate identification is given in the index by adding notes about dates, series and subsection of issuing body. All the different journals to which an abbreviation could refer are listed. A plea is made for minimum acceptable abbreviated form of journal titles. (Author)

33. Transportation

No Entries

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